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Mercerization of Cotton With Sulphuric Acid

Part I

The Theory of Mercerization—Sulphuric Acid Mercerization—Experimental—Equipment—Materials—Procedure—Mercerization and Testing—Dyeing—Luster and Appearance

By W. B. SELLARS and F. C. VILBRANDT

WHEN cotton is treated with a cold and sufficiently concentrated solution of sodium hydroxide, then washed free from alkali by water, the following changes are produced: (1) The characteristic twists of the individual cotton fibers disappear and the fibers become more cylindrical; (2) if stretched while being mercerized an increased luster results; (3) a shrinkage in length occurs; (4) the tensile strength increases; (5) the cotton shows an increased reactivity, and (6) an increased adsorptive power results, as shown by its increased affinity for dyes and increased capacity for adsorbing moisture.

Parchment paper is made [1] by treating ordinary paper with 75 to 84% sulphuric acid for a few seconds, the acid then being immediately washed out. A coating of hydrocellulose is thus obtained upon the surface, accompanied by a shrinkage in area and increased strength of the paper. Therefore it seems possible that a cotton fiber could be strengthened by the same process. In case a stiff or brittle fiber is obtained it should be possible to soften it, just as parchment paper is softened, by passing it through a bath containing some hygroscopic substance.

As to the actual nature of the process occurring when cellulose is treated with solutions of sodium hydroxide, opinion is still divided as to whether chemical compounds, such as alcoholates of cellulose and sodium or solid solutions of sodium hydroxide in cellulose, are formed, or whether the process is one of adsorption of sodium hydroxide. Each view has ample evidence in support of it. Clibbens [2] gives a very good summary of all work done in support of these three views to 1923. It will be more or less impossible to explain satisfactorily the shrinkage, increased strength and increased affinity for dyes until it is known whether the process is of a chemical or physical nature; an understanding of the colloidal changes accompanying the process will also be necessary. When these are known it may be possible to select the factors influencing the above factors.

Theory of Mercerization

Cotton is ordinarily mercerized by first washing it thoroughly to remove impurities, immersing it under tension for about five minutes in cold 27 to 32% sodium hydroxide solution, then washing successively with water, very dilute sulphuric acid and again with water in order to completely remove excess alkali. If an increased luster is to be obtained, it is absolutely necessary to maintain a tension upon the cotton while in the sodium hydroxide solution and during the first part of the water washing. There are a large number of references in the literature, especially in patents, as to the methods and conditions of caustic mercerization.

The physical properties of mercerized cotton and the conditions necessary for the acquirement of these new properties have been investigated in the literature. Cotton mercerized loose loses its flat, ribbon-like form, swells and becomes rounder, the broad, central lumen contracting greatly. The characteristic twists or convolutions also disappear. If the yarn has been mercerized under tension, the individual fibers appear perfectly cylindrical and smooth; the lumen contracts so much that it can barely be distinguished.

Lange [4] has explained the increased luster on cotton yarn mercerized under tension as due to the increased smoothness and more uniform surface of the individual hairs and the resulting increased transparency. This, according to Matthews,[5] is due to the fibers swelling transversely and contracting longitudinally, the cross-section becoming circular, so that when the ends of the fiber are

fixed a smooth surface is produced. Lange also states that hairs mercerized without tension show many surface folds which appear under the microscope as fine lines, while those mercerized with tension have the form of smooth, cylindrical rods. These views have been corroborated by Adderly [6] and Barrett.[7]

A different explanation of the cause of luster has been given by Hubner and Pope.[3] They found that solutions of sodium hydroxide up to 6.5% had no effect on loose hairs; solutions of 7 to 11.5% concentration produced a more or less rapid untwisting of the fiber; a swelling of the fiber was not noticed until the concentration of 15.5% was used, the swelling then occurring after the untwisting had become complete. With 17.5% sodium hydroxide solutions the untwisting and swelling occurred simultaneously, and with higher concentration the swelling preceded untwisting. Since 17.5% sodium hydroxide solution is the lowest concentration which can be used to obtain a luster under ordinary conditions, they draw the conclusion that for a luster to be produced the untwisting of the hair must occur after the swelling has stopped, or at least simultaneously with it.

Harrison,[8] however, performed experiments in which cotton hairs were stretched between holders and mercerized so that they could shrink only to the point where they remained straight and yet were under no tension. In this case no luster was produced on subsequent washing. If, however, the fibers were mercerized without removal from the holders and stretched to their original length before washing, a luster was produced. This behavior cannot be explained by Hubner and Pope's theory. Harrison comes to the conclusion that Lange's theory is correct. It seems impossible that the single hairs of a length of yarn being mercerized could be fixed so permanently by the type of tension ordinarily applied as to prevent the formation of spiral ridges as called for by Hubner and Pope's theory. On the whole, Lange's theory seems to be more nearly correct.

Sulphuric Acid Mercerization

Mercer [9] seems to have been the first to use sulphuric acid for the mercerization of cotton, according to a patent issued to him in 1850. He specifies the use of 62.1% acid at temperature below 10° C. Thomas and Prevost [10] in a patent issued in 1895 specify 61.4 to 70.4% acid. Hubner and Pope [3] used 66.1% acid, Grandmougin [11] 62.2 to 69.6% and Matthews [5] states that 59.7 to 70.9% acid can be used for obtaining a mercerized effect upon cotton. Heberlein [12] patented a process using sulphuric acid in concentrations greater than 51.2% for improving the appearance and strength of rayon.

Mineau [13] and Minajeff [14] used 62.5% sulphuric acid at 0° C. for treating cellulosic material, such as cotton fabric, to obtain a transparent, leathery product. Heberlein [15] has patented another process to obtain a crepe effect on mercerized cotton fabrics, using 62% acid at low temperature. Still another of Heberlein's patents [16] obtains a linen-like finish using 60 to 65% acid. Hury [17] obtains a wool-like finish by treating with 64 to 66.7% acid, followed by a special sodium hydroxide treatment.

Treated with acid of concentrations above 70%, cotton is rapidly attacked, being first gelatinized, then dissolved and converted into modified forms of cellulose and dextrin [18].

Hubner and Pope [3] obtained no improvement in luster when the yarn was immersed loose, while if immersed stretched it showed an improvement in luster, shrinking 9.5% in length due to this treatment. Grandmougin [11] states that the cotton treated by him acquired properties very similar to those obtained by treating cotton with sodium hydroxide, except that the luster was not as great. Mercer,[9] Thomas and Prevost,[10] and Matthews [5] merely state that the acid of concentrations specified can be used for mercerizing cotton.

Minajeff's [14] leathery product takes up water very easily and is dyed more deeply by Indigo than ordinary fabric. Mineau [13] states that his leather-like mass also shows an increased affinity for Indigo dyes. Harrison [20] gives a possible clue to the increased affinity of this product for dyes. He states that dilute sulphuric acid, dried on cotton, causes it to take up more of basic dyes, such as Methylene Blue, and less of direct dyes. He also states that the product is not an oxycellulose, but a colloidal hydrocellulose. Caille [21] performed experiments which showed that the fixation of Methylene Blue by parchment paper is due entirely to the sulphuric acid content, the amount of dye adsorbed increasing with increasing acid content. Mennel [22] found that cotton treated with a mixture of concentrated sulphuric acid and formaldehyde acquired an increased affinity for direct colors.

It will be observed from this survey of the literature upon the action of sulphuric acid as a mercerizing agent that experimental and practical details of the procedure in regard to exact conditions necessary and results obtained by following these directions are entirely lacking in practically every case. No effort has been made to correlate the data so that one could predict from a set of curves what effect the changing of a given factor would have upon the properties of the finished product.

Experimental

From the survey of the literature it is apparent that there are two reasons for the study of sulphuric acid as the mercerizing agent: (1) The recorded data upon the action of sulphuric acid is very meager, there being none at concentrations below 60%, and (2) the chemical action of sulphuric acid as shown by its parchmentizing effect and ability to cause an untwisting and swelling of the cotton fibers indicates that it should be possible to obtain a stronger thread with greater luster if the most favorable conditions are found. It was the purpose of this investigation to determine what conditions are the most favorable for the production of a mercerized effect upon cotton by sulphuric acid.

Winding Equipment.—For ease of treatment the cotton was taken from the cones, in which form it was obtained and put into skeins, each skein weighing 2 grams. A machine was constructed which would take the yarn from the cones and wind it into skeins, under a constant tension so as to obtain the same length each time, each skein containing a length of yarn equivalent to 2 grams, which was determine by a counter to measure the number of turns made. The machine also had a detachable device upon which a skein could be placed and remeasured in order to determine the shrinkage. This machine as finally constructed was similar to the ordinary yarn winder with tension control used by textile testing laboratories.

The forms upon which the yarn was wound consisted of flat sheets of 0.02 inch Monel metal, 3 by 9 inches, with 0.0185 inch diameter perforations, 144 per square inch, bent in such a manner that one turn of yarn wound on the form measured 13 inches (with the later described slips in place). Monel metal was used, as it is resistant to sulphuric acid. To enable the skeins wound upon these forms to be slipped off easily and without damage, slips of thin sheet tantalum 3 by 1½ inches were bent to the shape of the ends so that they could be slipped on and off easily. These slips then come between the yarn and the metal form.

These forms were made detachable so that they could be immersed in the acid without removing the yarn, serving as a means of keeping the yarn under tension while immersed. This was accomplished by making a slot in the shaft of the winder carrying the Monel metal form so that this form could be slipped into the slot and bolted to the shaft through holes drilled at right angles to the slot and corresponding in position to similar holes drilled in the metal form.

Tensile Strength Testing Equipment.—The tensile strength and extensibility were determined upon a Suter "Single Strand Strength and Elasticity Tester," which indicates breaking strengths of 0 to 2 pounds on one scale and 0 to 15 pounds on the other. However, it was only necessary to use the 0 to 2 pound scale in this work.

Auxiliary Equipment.—The acid strength was measured by means of specific gravity determinations made with a set of hydrometers. The error in measuring the acid concentration by this method was plus or minus 0.2%.

For acid bath vessels two-liter beakers were used. Skeins were suspended in the acid from U-bent glass rods. It was also found best to use much smaller, similarly shaped glass rods suspended from the lower end of the skeins to act as small weights to keep the skeins in a vertical position and prevent tangling.

The relative humidity necessary in making tensile strength determinations was found by using an ordinary sling-type psychrometer.

Materials.—It was extremely difficult to obtain a cotton yarn which would give a uniform tensile strength throughout its length. One yarn tested and rejected varied in tensile strength from 16.2 to 20.8 ounces, a variation of 4.6 ounces. The best which could be obtained was unbleached 33/2, combed peeler yarn, made by the Wiscassett Mills Company, Albemarle, N. C. On the average, as above, this yarn varied from 17.3 to 19.9 ounces in tensile strength, a variation of 2.6 ounces.

The sulphuric acid and ammonium hydroxide used were "Baker's C. P. Analyzed." The Monopole oil used was furnished by Jacques Wolf & Co., Passaic, N. J. It was used for wetting out the cotton before treatment. For determining the affinity for dyes, Chlorantine Red 6BL, made by the Gesselschaft fur chemische Industrie of Basle, was used. This was furnished by the Viscose Company, Marcus Hook, Pa.

Procedure

The effect of the acid upon the cotton was measured by the change in each of the following properties of the cotton yarn: Luster, appearance under the microscope, tensile strength, extensibility, affinity for dyes and shrinkage in length. Knowing the change in these properties, curves can be plotted showing the effect of each of the variable factors in the treatment with acid, the other factors remaining constant, upon each of the properties tested of the cotton. Since, however, it is exceedingly difficult to measure the change in all the above properties exactly and to maintain the variable factors at the same value each time without an unreasonable expenditure of time, the data found should be considered relative, indicating the tendencies toward change caused by the acid.

A. Mercerization

Two-gram samples of the Wiscassett yarn were prepared by winding off 169.2 turns on the winding machine. The sample is first wet out thoroughly by immersion in a 10% solution of Monopole oil in water, and then washed thoroughly to remove the oil. If not wet out in this way uneven results will be obtained. The sample is then immersed in a bath containing two liters of sulphuric acid of the concentration being used for the specified length of time. The sample is removed at the end of this period of time and washed immediately with cold water until neutral to Methyl Orange, then immersed in a 1% solution of ammonium hydroxide for a few seconds and again washed with cold water until neutral to phenolphthalein. Samples mercerized loose are dried by hanging on glass rods. Samples mercerized stretched are removed from the forms immediately after the final wash and dried loose.

B. Testing

Shrinkage.—After drying, the shrinkage is determined first by remeasurement on the winding machine. It is not necessary to know the actual change in length; the ratio of the decrease in the number of turns to the original number of turns per 2 grams yarn give sthe per cent

shrinkage. The method is only accurate to about plus or minus 0.6%.

The average of six tests on the shrinkage resulting when samples of the yarn were treated loose, but with only the Monopole oil, ammonium hydroxide and water, gave 2% shrinkage. Therefore, in comparing the shrinkage obtained in actual experiments using acid with that of untreated cotton, using no acid, if the value obtained, plus or minus 0.6%, is no greater than 2%, no shrinkage may be considered as having occurred. For samples treated stretched the normal shrinkage without acid treatment is 2.1%.

Dyeing.—One-half of the skein, or 1 gram, is next reeled off from the skein and used for the dyeing test. These skeins are wet out with Monopole oil, the oil washed out and the skeins then dyed in a bath containing 0.25% Chlorantine Red 6BL and 5% sodium sulphate at 60 to 80° C. for thirty minutes; the bath contains 60 c.c. of liquid per gram of cotton. The skeins are entered at 40° C. and the temperature then slowly raised to 80° C., after which the bath is allowed to cool; thirty minutes after the temperature of 60° C. was first reached the samples are removed, washed and dried. It is convenient to make up a standard dye solution containing 1 gram of dye per liter of water and pipette this out as needed, instead of weighing the quantity of dye needed on a balance each time.

It is necessary to run a blank on untreated yarn each time a dyeing is made and use this blank for comparison with the dyed samples. Comparisons are made by eye. In the scale used, "O" indicates the color of the blank, or the untreated cotton. Increasing depth of shade above that of the untreated is indicated by the series, "O+, A—, A, A+, B—, B, B+ . . ." Decreasing depth of shade below that of the untreated blank is indicated by the series, "O—, a+, a, a—, b+, b, b— . . ." Thus, "A" and "B" represent two shades of pink which are easily and immediately distinguished by the eye, "B" being darker than "A." "A+" indicates a shade between "A" and "B" which cannot be immediately detected, and which is nearer "A" than "B." "B—" is the same, but nearer "B" than "A."

These colors, obtained with Chlorantine Red 6BL, are compared with Ridgway's[28] color standards in the table on this page (Table I).

Several of the color numbers have the same Ridgway color number; this is due to the fact that these particular letter numbers, although different, resembled that Ridgway number more than any other Ridgway number. Two "O" numbers are given in this system; "O" is an untreated sample dyed in the same bath in which the shades darker than the untreated were dyed, and "O′" is an untreated sample dyed in the same bath in which the shades lighter than the untreated were dyed. The blank, or "O," color could not be obtained in exactly the same shade each time, making this necessary. However, since the samples dyed in a particular bath are compared only with the blank dyed in that bath and the letter numbers used refer to the same proportional difference in shade, no matter what shade the blank is, the results obtained are comparative throughout the data tables, regardless of the shade of the particular blank dyed with each.

TABLE I

Comparison of Color System Used in This Work with Ridgway's Color Standards

Color No. in System Used	Ridgway's Color No.	Ridgway's Color Name
O	?1 f	Rose Pink
A	?1 d	Deep Rose Pink
B	?1 d	Deep Rose Pink
C	?1 d	Deep Rose Pink
D	?1′b	Spinel Pink
E	?1′b	Spinel Pink
F	?1 b	Rose Color
G	?1 b	Rose Color
H	69	Tyrian Rose
I	?1	Rose Red
o′	?1′d	Thulite Pink
a	?1′d	Thulite Pink
b	?1′d	Thulite Pink
c	?1 f	Rose Pink
d	?1′f	Cameo Pink
e	?1′f	Cameo Pink

Tensile Strength and Extensibility.—Ten successive lengths are taken from the remainder of the skein and tested, the average being taken as the true strength and extensibility of the sample at the per cent regain of cotton at the time of testing. The regain is determined from tables by taking the relative humidity of the atmosphere in the testing room just previous to making the tests.

To obtain the true change in tensile strength and extensibility, the values obtained above must be compared with that of cotton having the same regain, and from which the loss in strength due to washing with oil, water and ammonium hydroxide alone has been subtracted and to which the gain in extensibility due to this treatment has been added. The following table (Table II) gives these values:

TABLE II

Constants for Wiscassett 33/2 Yarn

Tensile strength at 4% regain	18.04 oz.
Gains 0.51 oz. for each added per cent of moisture.	
Extensibility at 4% regain	3.93%
Gains 0.35% for each added per cent of moisture.	

Effect of Treatment with Monopole Oil, 1% Ammonium Hydroxide and Water

Loss in strength:	
No stretch	0.7 plus or minus 0.2 oz.
Stretched	0.8 plus or minus 0.1 oz.
Gain in extensibility:	
No stretch	1.3 plus or minus 0.2%
Stretched	1.7 plus or minus 0.0%

Thus, the actual strength of untreated yarn at the existing regain is first calculated, using the strength and extensibility at 4% regain as a basis. Then 0.7 or 0.8 oz. is subtracted from the strength, according as the sample to be compared was treated loose or with tension; 1.3 or 1.7% is added to the extensibility, as the case may be. The difference between the values thus calculated and those obtained on the testing machine with the treated samples gives the true change caused by the acid treatment.

Luster and Appearance.—Change in luster is determined by eye, comparing the sample with untreated yarn and with yarn mercerized by sodium hydroxide. A microscopic examination of the shape of the fibers is also made, noting especially the change in twist and appearance under crossed Nicols prisms.

(Part II will appear in an early issue.)

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PATERSON SCHOOL OFFERS TEXTILE CHEMISTRY COURSES

Silk City Dyers Pay No Tuition

AMONG the many courses in textile manufacturing methods given by the evening school division of the Paterson Vocational School are three courses in dyehouse chemistry. The school opened on October 1; the class hours for these courses are from 7.15 to 9.15. Residents of Paterson or students employed in that city are admitted to courses without charge.

A course in Elementary Chemistry is given by Herman Bosland, the course being designed to give dyers and other dyehouse workers a knowledge of the general elements of organic chemistry. A second course in Advanced Dyehouse Chemistry is planned to give more advanced students a knowledge of dyestuffs and their application to various fabrics, the chemistry of soaps, weighting liquors and other materials used in processing. The third course is a Research Course in Dyeing and Chemistry; the work will involve individual instruction with those students who desire to pursue advanced research in the field of dyeing.

Other textile courses offered by the Vocational School cover the manufacturing processes of winding, twisting, weaving, designing, cloth analysis, rayon processing and color harmony. A Research Society meets one night every week under the direction of M. B. Watson and R. J. Muller to discuss technical and practical problems of interest to mill men and to hear lectures by practical men.

TOO MUCH TAR IN GERMANY

Now Pave Streets with It

It is expected that the total production of crude coal tar in Germany in 1928 will reach 1,600,000 metric tons. Production has been stimulated by the unusually good demand for coke, according to a dispatch from Consul Hamilton Claiborn to the Department of Commerce.

Tar prices have not fallen appreciably because much of the tar is distilled by the producers, and a further large quantity is sold on long-term contracts. Crude tar is selling at 55 marks ($13.15) per metric ton. Production by gas works has increased because of the increased use of gas for heating purposes, but efforts of municipal gas works to promote the use of tar for paving have so far shown little results.

However, it is thought that twice as much tar would be consumed for paving in 1928 as in 1927, in spite of road building having been hindered by heavy rainfalls. Prepared tar and paving tar are sold at from 85 to 95 marks per metric ton. Tar roofing consumes considerable prepared tar, but the use of the so-called tar-free roofing, which partially substitutes imported bitumens, is on the increase.

The Capillarity Test and the Dyeing of Rayon*

Rayon-Dyeing Difficulties—Whittaker's Test—Findings of the Capillarity Test

By ALAN A. CLAFLIN

THE introduction of rayon as a commercial fiber brought new problems to the dyer. One of the most troublesome of these problems was that every now and then a skein of rayon dyed in the same bath with a number of others would come out a much lighter shade, or if the goods were woven before dyeing there would be a light stripe across the piece. Microscopic examination disclosed that the rayon filaments that composed the light dyeing skeins were imperfect in that instead of showing an even circle in cross-section, the circle was shriveled. Improvement in the manufacture of rayon has lessened the occurrence of the shriveled filaments, but even if it is a passing factor the problem is still with the rayon dyer.

Obviously it is impossible to have a pre-dyeing microscopic examination of the rayon filaments, and it was early found by practical dyers that certain dyes and certain methods of procedure lessened the light and dark differences between the skeins. It was found that dyeing hot, practically to the boil, and without the addition of salt, using dyes that exhaust quickly, was the best procedure. It should be stated here that this paper has only to do with dyeing rayon with that class of dyestuffs that are popularly designated as direct colors.

Charles N. Whittaker, the well-known English dye chemist, devised a test for the classification of dyes, as to their suitability for dyeing rayon and for their suitability for use in combination; for in a combination it is evident that all the dyestuffs should behave similarly, or no benefit will result from the excellence of one or two particular components. This test of Whittaker's, which is mentioned in the second edition of his well-known book on textile dyeing, and which gives a classification of various commercial dyestuffs arranged by it, he elaborated in a pamphlet on rayon dyeing issued by Courtauld's, Ltd., the large English viscose rayon makers. The method in brief consists in suspending strips of filter paper partly immersed in the dye solution and measuring how far up the dye is carried by capillary flow. Under standard conditions the various dyes are carried up from about 8 cm. to 20 cm. The dyes are given a number corresponding to the centimeters they flow, and the dyes that have the highest numbers are the most suitable for rayon dyeing—i. e., they tend to lessen the difference between rayon skeins.

*Delivered at the meeting of the Dye Division, American Chemical Society, held at Swampscott, Mass.

Range Includes No Blues

Unfortunately, the range of dyestuffs with the highest numbers is comparatively limited, and particularly troublesome is the fact that it includes no blues. Experiments were undertaken to see if assistants could be added to the test, both to improve the capillary flow and to lessen the difference between various dyestuffs, and then to apply such assistants to the actual dyeing of rayon. The data for such an investigation are either lacking or negative. Thus common salt was known to decrease the capillary flow. It was, however, known that Glauber salt did not decrease the flow quite so much as common salt, and for this reason was used by preference by rayon dyers. Further, it is known that a neutral soap is a better assistant than either common or Glauber salt.

On checking these observations by the capillary method it was found that soap decreased the capillary crawl and that the decrease was greater with the dyestuffs having the higher number; in other words, it did tend to equalize the dyestuffs. Now, there are two properties of soap that presumably may be considered in connection with its functioning as dyeing assistant. One is the slight alkalinity of its solutions —in other words, its pH—and the other is its property of reducing the surface tension of water. To ascertain to which of these properties is to be attributed the effect of soap noted, experiments were made with substances which have about the same pH as soap but do not have so much effect on surface tension—e. g., sodium bicarbonate and borax—and also with substances as the commercial wetting-out reagents—e. g., Neomerpin, Nekal A and Oranit, which have far greater surface tension lowering properties than soap. It was found that the delay or retardation of capillary crawl was due to the high pH rather than to lowering of surface tension. Inasmuch as dyeing ceases, or almost ceases, with increase of pH, the investigation came to an impasse and recourse was had to the Edisonian method of trying all the bottles on the shelf to see if possibly better results could be obtained.

It was found that alcohol and acetone increased the crawl of the low number and dyestuffs. Unfortunately, it is not practical to use such substances as

(*Continued on page 677*)

Proceedings of the American Association of Textile Chemists and Colorists

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FIFTY-THIRD COUNCIL MEETING

THE Fifty-third Council Meeting of the Association was held at the Engineer's Club, Boston, Mass., Friday, September 14, 1928, President E. H. Killheffer presiding.

The following members were in attendance: E. H. Killheffer, Joseph F. X. Harold, George A. Moran, William R. Moorhouse, William H. Cady, W. M. Scott, D. P. Knowland, L. A. Olney, H. Christison, W. S. Williams, R. F. Culver and W. E. Hadley.

Letters of regret at not being able to attend the meeting were received from J. Hutton, H. A. Barnes and E. C. Bertolet.

The following list of applicants were admitted to membership:

Active Members

Fruber, Charles, dyer, Wilson Bros., 1008 West Sample Street, South Bend, Ind.

Martin, Frank J., dyer, Wilson Bros., 1008 West Sample Street; 620 Rex Street, South Bend, Ind.

Scott, Edwin C., consulting chemist, 526 Clarendon Street, Syracuse, N. Y.

The report of the Secretary was read and accepted, covering the previous Council Meeting.

Owing to the absence of the Treasurer, no report was made in regard to the Treasurer's office.

The sub-committee recently appointed to correlate the work of the Secretary and Treasurer rendered a comprehensive resumé of the situation, but the recommendations, after considerable discussion, were held in abeyance until the next Council meeting, the President to confer with the committee in the meantime in order that a clearer understanding may be had of the entire situation.

Concerning the work already done in regard to manufacture and marketing of the Standard Washing Machine, Professor Olney reported that a copy of proposed contract had been received from the Atlas Electric Devices Company, and this contract was presented to the Council for review. The suggestion was made that before the contract was accepted legal advice should be obtained, in certain particulars, in order that the Association may be fully protected in its rights. Several changes were made in the contract as received, and this will be presented to the manufacturers and later will be acted upon further by the Council.

Attention was called to the necessity of a meeting of the Nominating Committee for nomination of officers for the year 1929, and the Secretary informed the Council that this was already well in hand.

Prof. Charles E. Mullin, of Clemson College, spoke at considerable length regarding the desirability of attracting capable young men to the study of textile chemistry and dyeing. He stressed the point that at the present time the young men are seeking other lines of training.

W. E. HADLEY, *Secretary.*

SEPTEMBER MEETING OF THE NEW YORK SECTION

THE opening meeting of the New York Section for the 1928-1929 season was held at the Building Trades Employers' Association rooms on September 28.

About fifty members and friends sat down for dinner and the meeting proper convened at 8.30 p. m. with Mr. Knowland in the chair. The minutes of the last meeting were read and approved. The Secretary read a letter from S. L. Hayes announcing his resignation as a member of the Sectional Committee, owing to business taking him to another part of the country. The Chairman appointed a committee, composed of H. Grandage, L. Zissman and P. H. Stott to make nominations to fill the vacancy caused by Mr. Hayes' resignation. The Chairman of the Program Committee gave his report of arrangements made for speakers during the coming year. This list is published below for the benefit of the members. P. J. Wood spoke of the establishment of a question box and the Chairman appointed the following committee to institute and maintain this new feature: P. J. Wood, chairman, L. Zissman, W. C. Hall, D. P. Knowland and P. H. Stott.

The Chairman then introduced the speakers of the evening, Dr. E. H. Killheffer, our national President, who gave a short address, followed by A. J. Hanley, Chief Chemist of the Textileather Corporation, who gave a very interesting talk on "The Manufacturing and Dyeing of Artificial Leather." These are published herewith.

After the business meeting Mr. Stott read the program which had been prepared for the year:

Program for This Year

ARRANGEMENTS have been made with the following speakers to address the New York Section during the coming season. Members of the section will note that many of these men are among the foremost authorities in their special fields and consequently well qualified to discuss thoroughly the particular topics they have chosen. It should be manifest that the papers scheduled are without doubt among the most valuable and instructive ever presented before the section, and it is hoped that members will reward the efforts of the Program Committee in arranging for the appearance of these speakers by attending meetings regularly and in large numbers. This program may be cut out and pasted on your calendar.

THE PROGRAM

October 26:

Dr. W. T. Anderson, Technical Director of the Hanovia Chemical Manufacturing Company. Subject: "The Light That Fades." This will consist principally of a highly interesting talk on the properties of quartz glass and its use in fading lamps for fastness tests.

William D. Appel. Bureau of Standards, Washington, D. C. Subject: "Progress in the Standardization of Tests for Fastness to Light." As the man who has undertaken extremely valuable research in co-operation with the work of the Association's Light Fastness Committee, Mr. Appel needs no introduction to members.

November 23:

Dr. B. Wuth, Ciba Company, New York. Subject to be announced later. Dr. Wuth is well known as an authority on all phases of textile printing and as the author of numerous scientific papers on the subject. Last year the Section had the pleasure of hearing his unique discussion of "The Chemical Constitution and Fastness Properties of Colors."

December:

No meeting.

January 25, 1929:

Prof. Wilder D. Bancroft, Professor of Chemistry, Cornell University. Subject: "The Colloid Theory of Dyeing." Professor Bancroft is probably acknowledged as the leading authority on the subject of Colloid Chemistry, and his discussion of the colloid theory of dyeing is certain to be an exceptionally authoritative lecture. He possesses the gift of presenting his subject in an exceedingly attractive manner.

March 1 (At Paterson):

David Wallace, American Dyewood Company. Subject to be announced. Mr. Wallace is known as a specialist in the application of Logwood and other natural dyes to textiles.

C. F. Hoppe, Oriental Silk Printing Company, Haledon, N. J. Subject to be announced. Mr. Hoppe has practically full charge of dyeing and printing at the Oriental plant and therefore will

undoubtedly have something very pertinent to say regarding the processing of silk and rayon.

March 29:

T. W. Marsson and Dr. H. E. Hager of the General Dyestuff Corporation. Subject: "Newer Developments on Indigosols and Rapid Fast Colors." The section has been treated on at least one previous occasion to an instructive exposition of the Indigosols and their application, and this discussion of recent advances made in these colors should therefore be of more than usual interest.

April 26:

G. W. Steiger, president of B. Thies, Inc. Subject: "The Thies Method of Dyeing." As a specialist in modern dyeing equipment this speaker will outline a method of dyeing that offers several novel features.

May 24:

The Annual Meeting of the Section and election of officers.

The introduction of the speakers and their addresses as delivered at the September meeting follow:

Chairman Knowland—In starting to-night it is a great pleasure to introduce to you our National President, Dr. E. H. Killheffer, who will speak to you for a few moments. Dr. Killheffer! (Applause.)

Wanted: Opinions on the Technical Bureau Project

By Dr. E. H. Killheffer

AFTER what I heard a while ago, it is quite a relief to be introduced as the first speaker because while we were having dinner one of the members asked the Chairman how many speakers there were to-night and he said, "One," and he said, "Well, isn't Dr. Killheffer going to speak?" and he said, "Well, of course, he isn't speaking." (Laughter.)

I want to congratulate the Section, of which I am proud to be a member, on having such a program arranged in advance, which I am very sure hasn't been done in any other Section of the Association up to this time. I am a little sorry that all of the remarks made about that program were not taken down, so that other sections could read about it and have some mark to shoot at.

In the Secretary's remarks about the meetings he alluded to the meeting in Paterson, which they plan to hold on February 22, and said they found that that was a holiday. I just wanted to comment on the fact that I thought most of the meetings in Paterson were holidays. (Laughter.)

The only topic that is on my mind to talk on to-night is something that I have already spoken about to this Section on one other occasion, and also to some other sections, and that is the proposed Technical Bureau of the Association. There has been sufficient time elapsed since we talked about it at one of those "holiday" meetings in Paterson so that you will have had plenty of time to think about it, if you were sufficiently interested to think about it, and the officers of your Association are very much interested in learning from some of you what you really think of the idea.

First and foremost, you can throw the thing into two broad classifications: Do you think it is a good idea? Or do you think it is no good at all and should be discarded?

Quite a little water has gone over the dam since we first talked about this thing. There is a laboratory in New York that is making tests for the Cotton Finishers' Association and is putting on a label which I believe they have copyrighted and registered with the Federal Trade Commission, and there is more recently a new laboratory which was started by the Better Fabrics League, a laboratory that a few of us had the pleasure of inspecting before we came to this meeting. I tried to get the gentleman from that laboratory to come over to the meeting, not to speak particularly but just to sit in with us. He had a lot of comments that were very interesting and that hit home pretty well. I recall distinctly one statement that he made, naturally from his angle. He said: "I wish the textile schools would start to turn out some graduates who knew how to do textile testing."

Of course, we took issue with him on that; but from his angle he was largely right, because he was looking at it from the standpoint of the consumer of the textiles, whereas we, in our deliberations, are usually concerned more with the production of textiles and with getting them sold, and then we try to forget them, although we are not always successful. But, really, what he was driving at was bringing closer together the producer of the textiles and the consumer of those same textiles.

That also was one of the prime aims of the proposed Technical Bureau of this Association. He tells me that he meets with all kinds of opposition in his work; people call him all kinds of pretty names because he interferes with their regular business practices. But, after all, the interest that our Association has and the point that we are always trying to make is that we want to make it possible for the ultimate purchaser of textiles to know what he or she is buy-

ing. In other words, we have no intention, as an association, of setting ourselves up as a board of censors and telling the stores what they should or should not sell, but we simply want some bureau set up at some point that can do testing for anybody who is interesting in having a test made, so that the ultimate consumer of merchandise might get goods of the texture, of the color and of the finish that they were paying for, and many times think they are getting but really aren't.

When I spoke previously to the New York Section about this matter there were a few comments. I remember distinctly that several members had something to say about it. That was also true in Providence. However, in some of the other sections there wasn't any comment of any kind made. You can realize that it is very difficult for your officers to know whether they are just trying to inaugurate some scheme that is a child of their own brain or whether they are trying to put forward a scheme that is really representative of the wishes of the Association at large. There is only one way that they can find that out, and that is if you as members will speak your minds on the subject. It will only take up a short time. If you want to write your letters to me I will be glad to read them. If you want to write them to any other officer of the Association, to your own local Chairman, or if you want to express yourselves at your own local meeting, that will be fine, but what we really want are some expressions of opinion.

I was looking over some of the questionnaires returned that were sent out by our National Secretary this year. I rather suspect that the returned questionnaires this year represent a greater percentage of the membership than in previous years. About 50% of the membership have returned their questionnaires. That may be fairly good as questionnaires go; but, after all, it is very difficult for the Association as a whole to carry out any definite scheme or plan of work unless they really have your full co-operation. Of that 50% of returned questionnaires, there were something less than one hundred—I think about eighty—in which there was a suggestion of any kind regarding the subjects to be discussed at the annual meeting, and out of those eighty suggesters there was one, or perhaps two, who suggested a willingness to present a paper.

If any of you have gotten together any of these programs you know that it isn't an easy task; and we may put a program together that won't be very interesting to you, if you don't take just the five minutes that it requires to sit down and fill out that questionnaire and send it back.

There is one other conclusion (that may not be a correct one) that I drew from those questionnaires. Out of approximately five hundred that were returned, there were fifty-one contributors to the Research Fund. If you drew a conclusion from that number you would perhaps say that the interest of the Association as a whole in this subject of the work of the Research Committee is not very great, although we may look at it the way one member suggested; that is, he thought the subscriptions of the corporate member should do the financing of the research work. That really is the basic intention, that the corporate memberships and subscriptions should finance the research work; but your officers want to feel that they have the whole Association, or a substantial part of it, behind them before they push too strongly on this scheme of a central bureau. At the same time, *right now* is the psychological moment for us to take our step; because, as I mentioned, there are several organizations that are getting to work on that very thing, and not one of them is nearly so well qualified technically as this Association, and one of them at least is very willing indeed to enter into some sort of co-operation with us.

Now, won't those of you who haven't returned your questionnaires just take five minutes to-morrow or Sunday and send them in? We would like to know what you think of this idea. Or if you have lost your questionnaire, write me a letter, or write a letter to some of the other officers. Register some kind of a vote or opinion on this general subject so that we know whether we ought to go ahead or whether we shouldn't.

Discussion: Financing the Technical Bureau

Chairman Knowland—I would like to ask Dr. Killheffer, to carry out a program such as he suggests it is naturally going to cost quite a little bit of money, isn't it?

Dr. Killheffer—It is going to cost a very great deal of money.

Chairman Knowland—And applying the proceeds from Corporate Memberships is going to be rather small for the simple reason that it is very difficult to get Corporate Memberships, and when you get them they are more likely to come in for the least amount which they can subscribe. For that reason we have recently passed a law that is applicable to Associate Membership. It was my idea that we could enlarge our membership through Associate Memberships. I know of a great many people that I could get on that basis and I thought we could start a campaign in the New York Section this year to get at least one hundred Associate Memberships at $5.00 that would help to finance the program you are trying to carry out at Boston.

Dr. Killheffer—Of course that would be very helpful; but the fact is, to carry out this idea of a Research Bureau it would mean that for the Bureau to command the respect that we want it to command if we set it up, we would have to have a staff there that would be of the very highest order, including men representing all the different phases of textile work; not only all of the industries that we ordinarily see at once in the picture, but the fellows who dry clean the goods afterwards, the launderers, the fellows who make the textile analysis as such; that is, the cloth analysis; somebody who is an expert on finishing. I think I have enumerated sufficiently so that you understand what I mean. We would need to have men of real ability in all these different branches, and we would need a Bureau whose equipment would be of the very best and most complete type. That means we would need money in a good deal larger amounts than $5.00 a throw; not that we are disparaging that $5.00 business, because every bit helps, but we would need a lot of Corporate Members, if you please, with a minimum fee of $100 a year.

One of these laboratories that I mentioned a moment ago is claimed to already have 1,500 subscribers at $100 a year, which is a rather tidy sum to start with. If we could in some way tie up with that outfit and get the services of the chap who is able to go out and sell those $100 a year memberships, we would get started on our idea quickly.

Another thing, of course, is that if we really adopt a plan that involves something that is really wanted—and that is what we are trying to discover, if it is really wanted; and it has to be wanted not only by the textile producers but by the textile merchandisers as well—and is really desirable, then we will have a lot more Corporate Memberships than we have at the present moment.

Chairman Knowland—This is what I was really driving at: If someone would endow us with $40,000, at 6 per cent that would only be $100 every year that we could spend; 100 subscribers would automatically give us the same interest and they would naturally be yearly members. I wanted to make the drive and go ahead because I feel sure that we can get 100 members, but I don't want to start out to do it unless I feel that we have the approval of the parent Association.

Dr. Killheffer—The drive for the Corporate Membership will have the approval of the parent Association. Whether that money would be devoted to this research plan is something that would have to be decided by the Council.

Chairman Knowland—You think it would be all right to start out making a Corporate Membership drive, do you?

Dr. Killheffer—I think it would be all right to do that, and there is nothing to prevent this Section from making a recommendation to the Council that the money be so applied.

Chairman Knowland—I have already done that. Are there any other questions that you would like to ask Dr. Killheffer? If not, before calling on the speaker of the evening there are a couple of things we ought to attend to.

Mr. Wood, would you like to elaborate a little on the subject of the Question Box?

The Question Box

Mr. Wood—Mr. Chairman and Gentlemen: While the Committee was deliberating on this question of program this summer we were wondering what would be the most interesting things to bring up before this Section; and during the general talk a discussion developed on the subject of how we could interest more of our members in the activities of this Section. We have about three hundred members in this Section and we very rarely get them all out. Of course, we take it for granted that there are a lot of people who join because they are good joiners and they pay their fee, and that is about the extent of their co-operation, but there are several of the younger men who don't come out to our meetings probably for various reasons. In some cases they have to take a railroad journey which is expensive and pay for a dinner which is also expensive, and in many cases their particular subject in which they are most vitally interested is not presented at any of the meetings, or at very few of the meetings, and some of these young men have problems in their daily work which they would like to have our assistance in solving.

So it occurred to us that it might be a good plan to establish what we would call a Question Box, so that problems involving practical matters in textile coloring could be sent to the Question Box anonymously. There are many men who don't like to attach their names to questions of this sort because they don't like to acknowledge their ignorance. They might very properly not be expected to know all these things, but they just have that little diffidence. We thought if those questions were sent in to the meetings, they could be discussed for half an hour by the members.

I would suggest that the matter be discussed and if thought advisable, we could try it out and see if we couldn't stimulate a little interest on the part of some of the younger members, or maybe some of the older members would like to ask questions at different times. I know I would.

Chairman Knowland—On the strength of Mr. Wood's remarks I am going to let that rest for a moment, but I am going to have a committee composed of Mr. Wood as Chairman, together with Mr. Stott and myself, if that is permissible, and we will start the Question Box going,

so that if you want to ask a question to be answered at any given meeting we will announce in the REPORTER as to just where those questions are to be sent, and if we adopt that plan the Question Box will be opened at the next meeting and we will have the questions discussed at the open meeting.

It is a great pleasure for me to introduce our first speaker of the evening, Mr. A. J. Hanley, Chief Chemist of the Textileather Company, of Newark, who will speak on "The Manufacturing and Dyeing of Artificial Leather." Mr. Hanley! (Applause.)

The Manufacture and Dyeing of Artificial Leather

By A. J. HANLEY

Mr. Chairman and Gentlemen: I feel that the "first real speaker" is a misnomer, very much as the title of the subject is; that is, I hope that it is not too great a disappointment to you to learn that artificial leather is not dyed.

Artificial leather is a coated cotton textile, and before getting too deeply into it, probably I should show you by samples how the term "coated textiles" is plainer in describing what is meant by artificial leather manufacture. Artificial leather is not only composed of imitations of real leathers for art goods; later we will see how hundreds of different objects are made by like processes, and that coated textiles is a much broader term for a general description of our product.

From the type of organization that I see you are, there can be to my mind only one real reason why Mr. Stott asked me to speak to you, and that is the fact that this, a practically virgin industry, is already manufacturing 40,000,000 yards a year. It is beginning to be an item that probably deserves your attention. I will represent this material's manufacture very quickly at first. Then, as I have brought along a large number of samples, you will all recognize some familiar article among them if you will peruse them later.

We will take sheetings whose weight varies from 7 pounds to practically a 2-pound sheeting; drills which vary from a 2.32 to a 1.90; satins that vary from a 1.55 to a 1.05; broken twills that vary in weight from a 1.32 to a 0.90; and, lastly, moleskins, which usually are of a standard weight of 0.83 (all on a 54-inch basis). These goods are sent through two factories, and sometimes three. The first is that of the finishing mill; that is, practically all of these cotton goods require some finishing of some type before coating. Some get extensive finishing processing, some practically none; in fact, some absolutely none. The material that is sent to the mills goes through limited processes, and because of the divergent properties of our resultant product they do not all take in all the processes. Therefore I will simply name the processes first and then, under a heading I may call "specific instructions," give you some idea of what we do with the different classes of materials.

We use a malt of Rapidase P. We have a soda ash boil and also a combination soda ash and caustic boil. We have two bleaches; one bleach that you will probably not feel too keenly for is the bleach on the jig; and the second is a full-bleach, using the customary procedure.

We use only cotton goods, and consequently only direct or substantive dyes. All dyeing is done on the jigs in alkaline baths, of course. We use no assistants such as Turkey Red oil. We use the ordinary retarding agent—salt—and for very light pastel shades Glauber salt is favored. There is one exception to jig dyeing; it is one we call "black," a very unsatisfactory dye. It is really a slate color which is applied by a pad-canning arrangement; that is, we pad on the dye and run it directly off the padding machine and, in the wet condition, onto the drying cans. In other words, the dye is really dried on the goods. No "aftertreatment," developing or coupling is given to any dye.

We have five different types of size. Sizing in the mill is an especially important feature in sheetings. Drills are often filled. Drills, moleskins, satins and occasional sheetings are napped.

Now for "specific instructions." Sheetings get the most treatment in the mill. Sheetings are invariably covered with light-weight coatings. These coatings are only semi-opaque. Their color is a very important feature to the consumer, and in order to maintain a uniform color throughout both the rolls and numbers of shipments it is necessary, in the case of sheetings, to have a rather close color match on the textile base. I have made up, roughly, some laboratory swatches which show you, I believe, an instance in which the same pyroxylin dope has been used, but with a variation of the color of the textile on which it was coated. You will find, because of the variation in color of the finished material, that it is important for us to dye fairly closely with this light-weight product. In dyeing sheetings practically all of them below a middle shade are dyed in the gray. Very few pass beyond a scour. Nothing is ever full-bleached except whites, which will be used on tablecloth material; or, occasionally, a very moley gray goods will require a half-bleach on the jig.

Filling on sheetings is very important, as you see, because a sheeting has an open weave—a 48-square, for instance—and as a very heavy dope is spread on with a knife (the sheeting passing under a stationary

knife), the heavy dope would be forced by the knife through to the back of the goods. Therefore, practically all sheetings are sized and filled in some way. This sizing will fill the spaces between threads, and the applied pyroxylin film will lie on the crest of the fibers to produce a flat, smooth surface. The coated material will consequently be "well-faced" and devoid of a "clothy" appearance. When a customer requires a very soft, pliable material, only a light size can be given (a dextrine size), and progressively hard sizes are given to take care of the customer's requirements for pliability or stiffness.

Drills usually have a heavier, more opaque pyroxylin coating than sheetings, and consequently less care is given in preparing the textile for dyeing to a close shade. Drills, accordingly, are dyed in the gray except pastel shades, which require a scour and white, a full-bleach. Drills in finishing get only a fill, and occasionally, with very light-weight drills that receive a very light-weight coating, a size also. The same application holds true as with the sheetings; that is, it must get a soft size at least in order to "face" properly. Satins, moleskins and broken twills are practictilally all dyed in the gray ,except where a customer requires a particular softness of his leather. For instance, we will see a little later in the discussion "uses" that a very large amount of moleskins are used on the quarters of automobiles. The material must be stretched and after stretching lie smooth and snug to a round corner, a shoulder. There it is necessary to have a boil on the moleskin to remove the stiffness of the gray goods.

The next stage in our process is to coat the material. Once again we tap the cotton supply; we nitrate cotton and produce a pyroxylin cotton. You all know what pyroxylin is, but I would just like to add one word about viscosities. The viscosities of cotton are very important. They vary when dissolved from very fluid materials almost like water to very heavy materials that flow with great difficulty; that is, very hard masses. If you are interested, I have samples here which you may see afterward, illustrating the variation in the body of a "dope" when all factors are constant excepting the viscosity of the "cotton" used.

The pyroxylin is the binder of the coating. If you would like a simile, it is the cement of concrete. This cotton is dissolved in the proper solvents, usually esters and ketones. For instance, the usual solvents in our work are ethyl acetate and acetone. Then, to prevent having too low a boiling point because it produces blushing—that is, a frosty effect over the coating—a small percentage of higher boiling point esters, such as butyl and amyl acetates, are used. Pyroxylin once in the solution will on evaporation of its solvents leave a clear, hard film. This film, therefore, could not be used as a coating as such. Nobody could coat any textile with such a stiff material, because its very contraction would curl the textile and give you a curled, crumpled mass for your roll such as this sample illustrates.

Incorporated into pyroxylin are, first of all, plastics. Usually in our industry it is castor oil, although we also use other plasticizers which, by the way, you will note are esters or ketones (the prerequisite quality of a solvent). For instance, the popular chemicals are dibutyl and diamylphthalate, and then the renowned lindol, which is a tricresyl phosphate, and its sister compound, a triphenyl phosphate. These materials lend, to what would ordinarily be a hard film, soft pliability. The pliability that results from incorporating these materials is almost mathematically proportional to the amount of plasticizer added. The plasticizer not only lends pliability, but it also, as its name indicates, lends to the pyroxylin plastic properties. That is, a plastic is a material which can be molded under heat and pressure. So that these materials are necessary from two points of view, namely: to lend pliability and also to aid plasticity to the pyroxylin while being embossed.

The film is still unusable and must be colored to give an artistic effect and to hide the textile to which it will be applied. I am speaking a little too hastily. Cretonnes, which have their artistic effect already printed on the cloth, are sometimes clear-coated with such a solution as I have already outlined for you.

Ordinarily, however, in the vast amount of work that we do it is necessary to incorporate pigments into the dope—pigments, not dye—such as zinc oxide and lithopones, for your white, carbon blacks, chrome yellow, orange and greens. Scarlet lakes—that is, red dyes—are precipitated upon alumina bases or barites as a base for producing bright-red pigments. Our para-reds use alumina as the base. These materials are ground in castor oil and incorporated into the dope to give it color.

Ordinarily, if the film is left in this condition the castor oil will decompose in a short time, and so it is necessary to preserve it in some way. The agent used most frequently is beta-naphthol. The wet dopes on evaporating usually leave an odor. Therefore, instead of supplying the customer with the disagreeable odor that usually is present with such solvents as toluol or naphtha, a positive odor is put in and we try as closely as possible to imitate the real leather or Cuir de Russé perfume. Usually we don't use that, by the way, but we use some terpene or tarry oil such as birch tar.

The resultant product is known as a "dope." This dope is spread onto the textile by means of the textile passing under a knife. This is a knife that is about half an inch thick and beveled like a half moon at the base. These heavy dopes ride in front of this knife while the traveling textile is covered with a thin film of it by the hydraulic pressure put upon the dope on its being forced into the curve of the knife. In our work it is spread in numbers of coats varying from three to eighteen; that is, only about two-thousandths of an inch is applied at one time. This thin film is carried with the textile, of course, into a "hot-box," which is a box whose length of travel down and back is about 44 yards and in which is circulating strong current of 70° C. air. The goods are rolled up again, the roll is turned around and these repeated number of coats are successively applied until the desired weight is obtained. That leaves a plain, smooth sample. The plain sample may be what the customer has ordered. Usually it is not. Usually he requires some kind of an effect to be produced. So the plain sample is brought to an embossing department, and there under heat and pressure an impression is put upon it. There are two types of machines used to produce this impression, namely: a press type, which simply consists of a heavy pressure being brought to bear upon the textiles, the impression being made by a heated engraved plate which rests or is forced against the face; and the second type of machine used is a heated roller. The roller grain consists in having two rollers, one of which is a paper roll and the second a steel-engraved roll in which the opposite to the impression design is engraved. These two rolls are allowed to idle together for some time and the paper finally takes up the opposite impression to the steel grain. Thus, as the pyroxylin-coated roll passes through these fitted engravings there is the positive force up of the paper roll and the pressure down of the steel engraving to produce such a distinct grain that in light-weight qualities the cloth base is deformed to follow the design.

The goods now pass to a finishing room, and here a coat of a different color is usually applied and we get a two-tone effect. Very often a two-tone effect is produced by not using a different color at all, but by varying the amount of pigment that is in the pyroxylin solution. Pigment has the following effect upon the solution: The less you have, the higher the finish, the higher the glaze. For instance, the glaze on that is perfect. There is no pigment whatsoever in it. On the other hand, the pigmentation in that is rather large; and, going still farther, in a type of that kind it is very dull, there being practically no shine or gloss to it, and that is produced by having a high pigment content in the film.

Now as to the uses to which we direct our material. Here is probably where you will be most interested. The largest single user of pyroxylin is the automobile industry. My rough guess is that of the 40,000,000 yards coated annually, they use at least one-half. Where does this go? Where can you find this material on your car? First, on the roof; second, if you happen to have a cabriolet type or other type of closed car that is not finished in steel on the shoulders, this material will also be on the shoulders; next, it is in the upholstery, the cushions and back; and then, on special cars such as the sightseeing busses and other busses of different types, the head linings; and finally in minor uses such as spare-tire covers, spring covers and radiator covers. Then we have foot pads and paneling on the doors. You can see the number of uses that the automobile industry can make of this material.

The second largest industry using this is the trunk and bag trade. The trunk and bag trade very often, for instance, on the highest quality of wardrobe trunks, uses a 20-ounce duck rather heavily coated on the outside and fitted on the inside with lighter weight sheetings and drills with rather artistic effects. It is also used for overnight bags, hand bags and cases of all sorts.

Then, the shoe industry uses large amounts. By the way, your shoes are not made of artificial leather, but the heels of ladies' fancy shoes, for instance, will be finished off in this material, for real leather would be too expensive. Then, too, the inside—what is called in our trade the "sock lining"—is of artificial leather.

Then, there are a great many uses for the material in the novelty and art goods line, such as, for instance, novelty boxes, tablecloths, card tables, luncheon sets, shower curtains and book bindings. The clothing industry uses it in manufacturing caps, visors, "windbreakers," rain coats and gloves. Sometimes I think that one can't look around without seeing it in some form or other. The chairs you sit upon may be upholstered with it. When you step into a railroad train the seats and curtains are all artificial leather or, more practically speaking, coated textiles.

Probably if you will examine some of these samples you will undoubtedly see just the types of materials better than if I were to enumerate them for you. The greatest pleasure I would have would be to answer questions which you might ask, because I would know then that I had covered the ground.

Discussion on Textileather

Mr. Wiehl—Do you ever use English vermilion in the coating?

Mr. Hanley—That is too expensive a pigment to use. You see, the scarlet lakes compete with it too strongly in price.

Mr. Wiehl—Can you use scarlet lake in the English vermilion?

Mr. Hanley—The scarlet lake will have a brilliancy within the pyroxylin coating of an English vermilion. The mass tone and opacity may not be present, but the brilliancy of effect will be there. A glaze, of course, will to a great extent overcome mass tone defects.

Mr. Stott—I think Mr. Hanley has some chemicals here and he has a piece of chemical equipment that looks like a spatula. I have seen a spatula before, but I don't know what he wants to do with one. However, whatever it is, I wish he would do it right now.

Mr. Hanley—Mr. Stott, I thought if anybody was interested I would show different brightnesses of finish.

Mr. Stott—We are interested in that.

Mr. Hanley—I think that would be best done by gathering around, so after I have answered the questions I shall produce the finishes.

There is a type of product that we produce that you are not at all interested in; that is, a competitor to cotton in the form of a paper base. Probably I should not call it paper, because it is a wood pulp impregnated with 30% of latex, which produces a very hard, tough material and can be readily made into the cheaper types of bags.

Here is a two-tone effect that can be produced, for instance, by simply varying the pigment content of the film.

Chairman Knowland—Have you by any chance made any materials that could be used for wall papering?

Mr. Hanley—This is too high-grade material for that use.

Chairman Knowland—Would your material stand for printing on it?

Mr. Hanley—Yes.

Chairman Knowland—What class of material do you use for coloring in printing work?

Mr. Hanley—We use pigments only.

Chairman Knowland—Do you have any trouble from peeling with it?

Mr. Hanley—No.

I might give you gentlemen an example of where the dyestuff industry can open up a new field in the textileather field, and that is in developing sun-fast dyes. (Laughter.) At the present time we do use nigrosine to produce a high gloss. Any pigment content in the finishing film is, of course, detrimental to the gloss obtained. Therefore, in producing the highest gloss possible we use this basic dye; and I would like to use other basic dyes if any of you can guarantee them fast to light.

Mr. Wiehl—What heat must it stand?

Mr. Hanley—It must stand a maximum heat on the embossing press of 220° F.

Question—Why must it be soluble if you use it as a pigment?

Mr. Hanley—That is all well and good if you can produce the dye at pigment prices. We would just as soon use a dye as a pigment if you can get the brilliancy by pigment grinding; but ordinarily the desired dye should pass into solution and become a homogeneous constituent of high tinctorial power. Small amounts would, accordingly, yield the desired effect. That is why paratonia and those other toners are used. For instance, in producing light reds large quantities of dyes are used. Those materials (toners) used in our work produce a very brilliant color, but we avoid them because of their expense. I wouldn't like to see many samples come in and use toners in producing their color effects.

Mr. Wiehl—You are comparing those with the earth colors?

Mr. Hanley—No. We use only chemically pure colors; that is, we use Prussian Blues and Chrome Greens, orange and yellow, zinc oxide and lithopones —only chemically pure colors. We don't us anv earths at all. It is too hard to control their colors. Where we have three thousand color numbers on our books it is necessary to compound the color fairly rapidly, because ordinarily there will be sixty colors a day on your machines. With earths that vary so far from the standard color, it is practically impossible to use them.

Mr. Wiehl—Don't you use umbers?

Mr. Hanley—No earths of any kind. Just chemically pure pigments.

The Cleaning Problem

Mr. Wood—Isn't that a very dirty mess to clean up from your apparatus?

Mr. Hanley—How you can pick out a difficulty! (Laughter.)

Mr. Wood—Do you have any cheap solvent that you can clean up with?

Mr. Hanley—No, unfortunately the solvents for pyroxylin are quite expensive. For instance, in making up a pyroxylin solution it would be folly to use a solvent for pyroxylin straight. Your esters and ketones are so much more expensive than such diluents as benzol, toluol and naphthol that you have to lead your compound with them (diluents) to bring the dope down to a proper consistency for spreading. Fif-

teen per cent of acetone in benzol is a cutter, so we make up these cutting solutions just to soften dried dope, and then we scrape and rub the softened mass off with a rag.

Question—Do you have any trouble in mixing your dry colors with your dope, in getting it perfectly mixed?

Mr. Hanley—The colors are ground in castor oil and brought to a standard color.

Question—Do you ever try these colloid-mill types of machines in order to incorporate it?

Mr. Hanley—No, we wouldn't find it necessary to employ an equipment of that type, because the castor oil is perfectly soluble in all of the solvents used and it helps to fluctuate the fine pigment particles when the oil around each of them dissolves in the solvents of the dope.

Question—You have to grind it, and mere stirring won't give you a smooth enough body?

Mr. Hanley—Grinding sometimes on very, very dull effects, where to incorporate very large quantities of oil-ground pigment would produce an oily, sticky finish, it is necessary to use a dusting powder. That is, the pigment is bolted into the solvent directly instead of grinding it into oil. We use that very seldom, because we experience a number of difficulties due to specks where the bolting cloth isn't fine enough to retain too large particles, and such conditions as that. A very excellent way of accomplishing the same result, if you can afford the expense, is to grind the pigment in oil and extract with the solvent. Evaporate your solvents from the oil extraction fluid and use your oil repeatedly in the same manner, if it is necessary to manufacture large quantities of this material.

Question—Do you use a solvent recovery system?

Mr. Hanley—No. Some plants do. Du Pont at Newburgh does, and really they are the only ones. Other plants have solvent recovery systems, but they recover such a small fraction of the solvent that an engineer would never call it a solvent recovery plant. There is an economic balance regulating installation. For instance, Newburgh has to spend, I believe, about $1,000,000 to incorporate solvent recovery, and you can write the interest on that off with solvents to quite high tonnages, you see. There is no question about the fact that all these plants, in order to economically survive, must eventually, when the pressure is great enough, have solvent recovery systems.

By the way, speaking of solvent recovery, Ford, for instance, had solvent recovery and they later abandoned it because of hazard vs. ecomonic balance.

Dr. Harold—Might I ask Mr. Hanley how many hours of Fade-Ometer test on his treated fabrics he regards as establishing their power of exposure to automobile conditions of aging?

Mr. Hanley—It is necessary to meet a Fade-Ometer test in Ford's specification for deck material, and we use them as a standard because of the fact that they are the most modern in their line when it comes to scientific control. We have set six hundred hours on the Fade-Ometer as a standard, and at the end of that time the sample is taken from the Fade-Ometer and bent around a ⅛-inch steel pin. If the film cracks as the result of bending, the sample is rejected.

Use of Rubber in Dope Suggested

Mr. Schaumann—Have you ever tried to incorporate rubber in the dope?

Mr. Hanley—No, it is not compatible from many standpoints. First of all, the pyroxylin film must separate out in a clear homogeneous film or around a foreign particle. Do you see what I mean? That is, it must separate out with materials that are compatible with it, or around a pigment article. On the other hand, when rubber is in the dope solution, the pyroxylin, not being compatible with it, would give a frosted appearance on evaporation rather than a clear film. A frosted appearance means a weak film.

Mr. Schaumann—I thought it would give it a sort of clouded effect.

Mr. Hanley—That is just it—that smoky, smudgy effect; but that is the very indication that shows a weakened film.

Mr. Schaumann—Wouldn't it make it a little more plastic if you could incorporate some rubber there?

Mr. Hanley—Do not mistake elasticity and plasticity. That is, the plastic substance is a substance which can be molded and retains its shape under heat. The only plastic substance in our material is the pyroxylin itself. The plasticizers lend plasticity, and in order to lend plasticity what you really do is to keep the nitrocellulose in a solid solution of a solvent. You notice, for instance, that the usual solvents for pyroxylin are esters and ketones; and when I spoke of plasticizers I repeated that they were esters and ketones. You really keep your pyroxylin in a solid solution of a solvent for it all the time. If you use enough plasticizer it will actually dissolve your cotton and you will have a fluid solution as the result. That is, when you incorporate a plasticizer into nitrocellulose you get progressive softness, and finally you have a fluid solution.

Dr. Harold—Mr. Hanley, I would like to ask you what you regard that six-hundred-hour test as equivalent to in sunlight exposure? I understand that the factors for leathers and artificial leathers and textiles for the

Fade-Ometer are entirely different. I would like to know if you have any experience as to what that factor is.

THE FADE-OMETER TEST

Mr. Hanley—The Fade-Ometer really was never designed, and should not be used on artificial leather at all; similar changes to those experienced under weather conditions are never duplicated on the Fade-Ometer. The Fade-Ometer is used as a standard of film strength and durability by the arbitrary *standard* set by the Ford Motor Company, and they setting it, and we finding that it gives an indication of what microscopically thin finish condition to expect at approximately one year, we use it.

Dr. Harold—You regard the six hundred hours as equivalent to one year as far as light is concerned.

Mr. Hanley—As far as weathering conditions of the deck—such conditions as moisture repellant, and so forth. Of course, the six hundred hours, after you have it, means you have pretty nearly a month tolled off and the film begins to get brittle. That is the idea of rolling on the pin, to get an idea of how elastic the finishing film materials have been.

By the way, this is Henry Ford's idea of the test: They claim that the Fade-Ometer oxidizes the castor oil to a substance that is no longer compatible with nitrocellulose, and being a foreign material and having accompaniment removal of plasticizers, the pyroxylin consequently becomes brittle, and when a pyroxylin is brittle its life is very short.

Dr. Harold—Is that true even if the castor oil isn't acidic to begin with?

Mr. Hanley—It is not an indication of the oxidation of the castor oil in corresponding weathering conditions; that is, on the Fade-Ometer the castor oil is oxidized immediately upon the surface only. At the end of a year of weather conditions the castor oil will be oxidized uniformly throughout the film in approximately 10% of the original amount added, and thus the Fade-Ometer test, as the Ford Motor specifications lay it down, is really not an aging test but it is a test of the elastic limit of the film used in finishing.

Mr. Wiehl—Do you use any bone black?

Mr. Hanley—Yes. You see, we use bone black instead of a carbon black in our material because, unlike the lacquer industry, we don't attempt to make a small amount of pigment do the covering of an object sprayed, for instance. We sell on a weight basis, and therefore it is necessary for us to use pigments in which we get less tinctorial power and more weight. (Laughter.)

Are there any other questions?

Dr. Schroeder—I would like to ask if you have ever noticed that lindol has any tendency to retard that oxidizing effect of castor oil?

Mr. Hanley—Absolutely. It is a much better plasticizer than castor oil. Castor oil is not an ester or a ketone. It is not in the true sense of the word a plasticizer because a plasticizer is a solvent for pyroxylin. Castol oil is a softener. The use of lindol is really one of the features that we make in our decks; the finished films are plasticized with real plasticizers rather than with castor oil, which makes textileather one of the best leathers produced.

Question—In making a nitrocotton how high a nitration do you get? What per cent of nitrogen do you get?

Mr. Hanley—It ranges from 11 per cent to 12.5, the 12.5 being gun cotton. It was one of the early theories on pyroxylin that the viscosity was governed by the nitrogen content. That has been abandoned because they actually can get the nitrogen content up to 12.5 without having a gun cotton; that is, a gun cotton is not soluble in the ester, while a 12.5 pyroxylin cotton is readily soluble in ethyl acetate.

Question—That is as low as 11.

Mr. Hanley—Yes. Nitrogens used to be determined always when a sample was submitted by a vendor but to-day it is never determined. I mean that the viscosity is a factor that can only be determined on some type of viscosometer, and is independent of the nitrogen content of the nitro-cotton.

Question—Have you ever had any trouble in filling your films containing bronze powders?

Mr. Hanley—We do. Of course, there are nitrates of cotton produced which are guaranteed to give non-coagulating jellies for the use of bronze fillings, but we do not buy them. The bronze will stand in the jelly solution, at the least, three-quarters to one hour. The bronze will be the last ingredient put into the pyroxylin dope and the jelly will be set on the machines directly after incorporation of the bronze. This procedure gives us sufficient time ordinarily, so we do not have any trouble. This is a case where we do have trouble occasionally; when a bronze powder cannot be mixed at the machine and used immediately on the machine. The leather industry is developing what you might call semi-bronzes, that is, 90% of the color is due to a pigment effect and 10% is due to a bronze powder effect. In order to get proper color it is necessary to work it, to match it before it goes to the machine, and there we experience difficulty sometimes; that is, with the rate that we can get it to the machine and on the machine before it sets, before it jells.

Mr. Wiehl—Can you use bronze powders dyed with anilines?

Mr. Hanley—Yes, we buy those. We use, I should say, twelve bronze powders, and of those about seven or eight of them are aniline dyed.

Question—Have there ever been any attempts to incorporate rubber into the dope?

Mr. Hanley—No. Here is the relationship between rubber and pyroxylin: If a mutual solvent could be found for pyroxylin and rubber, the way to use it would be to put a prime coat of rubber on the fabric first and then to use the pyroxylin afterward on the surface. Remember always, that pyroxylin has made great strides in the industry, and particularly in the automobile industry, by virtue of appearance, which appearance is due to its plastic properties in taking a grain, taking an impression, and also its brilliancy and the color effects possible. Rubber is therefore useful in our industry only for its long-life, aging properties, and its place is as a prime coat. Where we use it, it is in double texture material; that is, we take—and this is how all automobile decks are made—a sheeting and spread two coats of rubber cement on the sheeting. We take a drill and coat from three to five coats of rubber on the drill. Then we combine them, put them through two steel rollers under pressure, and that is the base for all automobile deck material. Oftentimes in a semi-convertible car, instead of using a drill on the back, a whipcord is used, and then there is no head lining nor are any ribs put in the roof of the car. I have a sample of whipcord here.

Mr. Low—My point was that if rubber were combined with pyroxylin in the dope, wouldn't the probability be that the coating would keep its flexibility longer?

Mr. Hanley—No, you see rubber is not a plasticizer for pyroxylin.

Mr. Low—You mean that pyroxylin would still break up after a time; it would still lose its plasticizing qualities and become brittle even with the rubber there?

Mr. Hanley—Exactly. The original film would not have a high quality. It would be a film that was in a very amorphous spongey condition; that is, the rubber would precipitate the pyroxylin out rather than to leave it as a clear film unless a mutual solvent was used.

Mr. Low—We have made some tests, the technology of which I don't know and I wanted to have them checked at some time. We made a coating of pyroxylin alone, another coating of rubber alone, and the third one by the use of a common solvent for the two, and the one in which the rubber and the pyroxylin were incorporated endured in the Fade-Ometer much longer than the others did. There was no particular reason or theory that we had for it, and I was just asking you to see what experience you had had.

Mr. Hanley—What type of film strength did you get?

Mr. Low—I don't know the technology of it.

Mr. Hanley—Do you recall the solvent of the two?

Mr. Low—Hexamine acetate.

Mr. Hanley—Which would make it very prohibitive in industrial use.

Mr. Low—Probably.

My point was this: Would the rubber and the pyroxylin together have some effect, the theory of which we might not yet know?

Mr. Hanley—No. Ordinarily, first of all, the rubber is simply a loader because it is non-compatible with the pyroxylin. Any plasticity that it would add to it would be as a foreign particle. But the plasticity that you would get would be a superficial one; that is, it would be somewhat like the plasticity of a layer of salt, to exaggerate it very greatly. In other words, if you spread a layer of salt on this and bent it, you would have no more difficulty in bending it than you have at the present moment. That is a disadvantage in the fact that the film must not only be plastic or bent with ease, but it must be a strong film; it must stand abrasion. The automobile, for instance, is going to pass under trees and have other abrasive substances put upon it, such as sand soaps for washing off dirt, and so forth.

Mr. Low—This film had seemed to last a good deal longer than the single ones on a Fade-Ometer after they were taken off.

Mr. Hanley—How long were they run?

Mr. Low—Until the pyroxylin and the plain rubber had been broken up.

Mr. Hanley—It is pretty hard to say without having some idea of the amounts, and so forth, as to why the film ruptured.

Mr. Low—The three were comparative, having all the other things the same.

Mr. Hanley—You didn't, of course, have in the rubber any oils or anything of that type, did you?

Mr. Low—I don't remember.

Question—It wouldn't hold the embossing?

Mr. Hanley—No.

Mr. Low—The other two would?

Mr. Hanley—Yes.

Mr. Low—I have a piece of raincoat material which was made up in that way. I believe the firm that made that made some raincoats. I don't know the history of it.

Mr. Hanley—Was any literature published on that?

Mr. Low—Very little has been published on it as yet.

Mr. Hanley—I would be interested in the development that you got from it.

Are there other questions? Suppose then that those of you who are interested in seeing where bookbinders come from and different articles of that type, examine these, and anyone who is interested in other types can examine these.

Chairman Knowland—Before coming forward to look at any of these samples, we fortunately have not another speaker with us this evening, but we have a guest who is well known in Europe and only recently has been making a visit to the United States, and I think he would like to give us a word or two of greeting from one of our German technical societies. I would like to intro-

duce Mr. Melliand, publisher of the Textilberichte. (Applause.)

Mr. Melliand—Mr. Chairman and Gentlemen: I am not as yet in full command of your language. I only wish to thank you for your kind reception and for the privilege of attending your most interesting meeting tonight. I have the honor and the pleasure to bring you greetings from the President of the International Association of Textile Chemists and Colorists, Mr. Schmidlinlindt, of Richterswil, Switzerland. I thank you. (Applause.)

Chairman Knowland—A few moments ago I suggested the Question Box Committee should be composed of three of us. I believe possibly it would be better if we made that five. My reason is that I don't want it to appear as though one or two of us are trying to do all the work, and then again, as I thought it over, there are many subjects that ought to be touched upon that perhaps three of us wouldn't know anything about.

For instance, I have in mind the hosiery business, and I think we ought to be represented in that field. Will you serve on that committee, Mr. Zissman? (Mr. Zissman acquiesced.) I would like to have a fifth member on the committee and I am going to ask Mr. Hall if he will serve, as he is more or less familiar with jig dyeing and piece dyeing. If anyone wants to ask a question, address the letter, either signed or unsigned if you wish, to the American Association of Textile Chemists and Colorists at 90 William Street, New York, and it will be turned over to the committee and read, and if the question asked is of sufficient importance and a proper one, it will be turned over to anybody who wants to work on it or any laboratory that cares to elaborate on any answer given, and the answer will be given at the next meeting.

Mr. Wood—If it is impossible to get an immediate answer. But if anybody wants to answer it at that meeting, he can do so.

Chairman Knowland—If there is nothing further to come before the meeting a motion to adjourn is in order.

. . . It was so voted upon motion made and seconded, and the meeting adjourned at ten-five o'clock.

The American Association of Textile Chemists and Colorists*

By Dr. E. H. Killheffer
President of the Association

MY subject is a very broad one, but it gives opportunity for a restatement of just what objects were in view at the time the Association was formed and any modifications or additions to those original conceptions. At the outset let us consider the three prime objects of our Association as stated each year in the fly-leaf of our Year Book. They are:

1. To promote the increase of knowledge of the application of dyes and chemicals in the textile industry.

2. To encourage in any practicable way research work on chemical processes and materials of importance to the textile industry.

3. To establish for the members channels by which the interchange of professional knowledge among them may be increased.

Now, then, what has the Association accomplished in the furtherance of these objects? In the first place, every meeting of every section is an open invitation to all members to present and to hear and discuss matters which result in the increase of general knowledge. We individually get something out of the Association in the proportion to what we bring in. We may bring only a little, but the sum total is great if the number of small contributions is great.

As to the second object, the encouragement in any practicable way of research, I shall have a little more to say later.

As to the establishment of channels for the members by and through which the interchange of professional knowledge is made easy, I might again refer to the various meetings of all of the sections that go to make up the Association, as well as to the proceedings which are regularly published, as forming together a channel for such interchange of knowledge.

Now let us go back again to the subject of encouragement of research. This, I realize, might be susceptible to several interpretations, and it might be contended that the Association as such should only strive to encourage research but should not itself attempt to carry on research under its own auspices. If the first interpretation is acknowledged as correct, then we might say that the most that our Association could do would be to find means of encouraging research by other institutions or societies, or perhaps existing commercial laboratories and research bureaus, and it may be that under proper conditions procedure along this line would be the wisest course. A second interpretation would be that the Association itself should establish an institution or a bureau so that it could have direct control of just what the activities of such an institution should be. It is naturally pretty difficult in any large organization to fully determine the sense of the entire membership on a subject such as this, and it has seemed to me that the best way was to propose something definite and then either adopt it, modify it or reject it in its entirety in accordance with the will of the Association as a whole.

At several of our sectional meetings I have made

*Paper delivered before the Piedmont Section at its meeting held in Charlotte, N. C., October 13

definite proposals that this Association in its own name set up a technical bureau, and briefly the idea was something like this: The location of the bureau would be New York City or in that general neighborhood, because of its central location as regards not only the production but the merchandising of textile materials. The intention would be that the staff of such a bureau would of necessity be of the very highest order, having in charge of each department at least one man who was an expert in that particular field. The bureau, of necessity, would be equipped most completely for the investigation of all of the many different problems that are a part of the textile industry. In other words, both as to personnel and equipment the bureau would have to be equipped to handle problems having to do with the textile fibers themselves and all materials of any kind that in any way are used in the processing of them.

There is a great deal that such a bureau could accomplish for the benefit of the whole textile industry, the opportunities ranging from fundamental, pure science research to definite, day-to-day problems and their solution. Besides this, there is a great deal of work being done at this moment by various laboratories which act as umpires, if you please, between textile producers, retail sellers and ultimate consumers. It is, I believe, true that work of this nature could be handled under the auspices of our Association in a more thorough and authoritative way. Now, we may ask ourselves, does the textile industry desire any real scientific investigations and solutions of its problems? I might quote briefly from an address by John E. Edgerton, himself a textile manufacturer, before the Philadelphia Textile School, in which he says:

"The industry needs now and will need in increasing degree not only dependable direction in the scientific development of mechanical processes to meet multiplying necessities, and not only facilities for research which is becoming daily more necessary to our economic progress, but well-trained men upon whom, in the last analysis, hinge the successful operation of all machinery and the values of all scientific formulas."

This is but one of many similar utterances of men who ought to know what the textile industry of the United States needs. Some of you may have read in Scribner's Magazine for September an article entitled "Research—the Business Builder" by Silas Bent, some of the vital portions of which are quoted in the September 17 issue of the AMERICAN DYESTUFF REPORTER. Of particular interest in these remarks is the one referring to the fact that *"research men work nowadays in groups,"* which is very true, and which is fully realized by industries that have been and are to-day carrying on systematic research on a large scale. In a bureau such as we are attempting to visualize there would be groups of experts carrying on their investigations and co-ordinating their efforts according to the best practice of the present time, and in this way it is thought that such group researches or investigations in a large bureau could accomplish things that the individual chemist in an individual mill does not have time or facilities to do. This is very briefly a picture of the suggested bureau, and more complete descriptions can be found in some of my past remarks on the same subject, particularly those before the New York and Providence sections.

Surely it is not necessary before a gathering such as this for me to use any persuasion as to the real need of research for the textile industry in the United States. This need has been recognized and spoken about by leaders both in and about the textile industry for a considerable time. In a recent issue of the Journal of Industrial and Engineering Chemistry there is an editorial dealing with the laboratory setup a short time ago under the auspices of the Better Fabrics League and the National Retail Dry Goods Association, and it is pointed out that this particular activity gets pretty close to letting the consumer do it instead of the textile industry itself. Our lack of textile research in the United States has been deplored by Professor Mullin in an article that he wrote for the Journal of the Society of Chemical Industry. Some of you are familiar perhaps with a step that has been taken in this direction by the National Association of Finishers of Cotton Fabrics, who are attempting to set up some brands and brand-marks that will really mean something in the way of telling what the fastness of the goods is. This activity is, of course, a definite recognition of one phase of the great need for research in the textile industry.

It is realized that to carry out an idea of this kind a very considerable sum of money would be required. The only way that such a sum could be obtained would be by the co-operation financially of a large part of the textile industry and other interested industries as well. Needless to say, we cannot obtain such financial co-operation unless the idea itself has a strong appeal to the people to whom we are trying to sell it. Now, as I have talked before the various sections I have always asked for comments or criticisms and up to the present time very few have been forthcoming, so that your officers to-day are not in a position to say whether this Association thinks that this project is a good one or a bad one for the Association to embark upon. Recently one criticism has come to my attention: that our Association was originally established for chemists and dyers, and that an idea like the above envisages more especially a benefit

to the manufacturers instead of to their employees who are our members. Personally I cannot see how the fortunes of our members and of the mills by whom they are employed are not tightly bound up together. If one prospers the other prospers, and vice versa.

Another criticism is to the effect that this idea is another instance of the fact that our Association is fast becoming an Association of textile and dyestuff manufacturers. I wish that I could say to you that textile manufacturers as such were much more interested and active in our Association than they are, because in my opinion that is exactly what we need, unless my conception of the Association is altogether wrong. As to it being an Association of dyestuff manufacturers, that is obviously ridiculous. I believe that I can state without fear of contradiction that no dyestuff manufacturer has got anything of gain out of the Association, nor does he expect to do so. The technical men connected with the dyestuff manufacturers, particularly that end of the business having to do with application problems, have naturally joined the Association because that is the proper place for such technically trained men; but as to the dyestuff manufacturers, all they have done is lend the Association their financial support, which they are glad to do because they consider it a worthy effort.

One word more about the research bureau. It may interest you to know that in the dyestuff industry in the United States the amount spent for research each year is equal to 4% of their total sales volume, and if an amount were to be set aside by the principal factors in the textile industry equal to one-tenth of 1% of their sales volume, there would be available $2,750,000 annually for research work for the benefit of the industry.

Now as to whether our Association should engage in such an activity or not is for you members to settle and not for me to say. As I stated in the beginning, I have made a suggestion. It was first made months ago. We are still waiting for a real expression of opinion on the part of the membership and I am going to propose that we submit the whole matter to an actual vote of the membership, because it must be obvious that I have plenty of other things to do personally without devoting time and energy to a furtherance of an idea of this kind if it is not desired by the people who would be the beneficiaries. Bear in mind, there are three possible ways of dealing with this subject, as pointed out in the beginning: either the adoption of an idea, molding it somewhat after this one, or co-operation with existing bodies that are now engaged in this sort of work, or rejection of the idea entirely as an improper activity of our Association. You members can make the Association anything you want it to be, but to do so you must express your wish in some way, either in your local sections or in communications to the Council, or directly to the official organ of the Association, where they will be published in the proceedings.

Nominations for Officers and Councilors for 1929

IN accordance with the provisions of the amendment to Article VIII of the Constitution the Nominating Committee of the Association offers the following names for officers for 1929 and councilors for three years:

President:	E. H. Killheffer
Vice-presidents:	Jos. F. X. Harold
	Walter S. Williams
Treasurer:	W. C. Durfee
	H. R. Davies
Secretary:	Alex Morrison
Councilors:	Wm. R. Moorhouse
	W. M. Scott

Counter nominations for any offices signed by at least ten members may be filed with the Secretary not later than November 1. The Secretary shall then prepare and issue an official ballot containing the names of all nominees.

Applicants for Membership

Active Membership

Gow, Robert, technical man and salesman, H. A. Metz & Co., St. Louis, Mo. Sponsors: A. J. Mease and A. T. Brainerd.

Marnock, William S., overseer of dyeing, Pacific Mills, Lyman Division, Lyman, S. C. Sponsors: Dyer S. Moss and M. Mackenzie.

Pierce, Edw. W., demonstrator, Ciba Company, New York Citr, N. Y. Sponsors: D. P. Knowland and A. F. Wiehl.

Waffenschmidt, Henry, demonstrator and salesman, National Aniline & Chemical Company, 3306 Arrow Avenue, Cincinnati, Ohio. Sponsors: C. E. Bick and Ed. Weber.

Junior Membership

Hurd, Ira S., student, Lowell Textile Institute, Lowell, Mass. Sponsors: L. A. Olney and C. L. Haworth.

COLONEL METZ HEADS CHEMICAL SECTION IN RED CROSS DRIVE

The chemical and drug field and allied industries in New York City will be intensively covered this fall in the roll call membership appeal of the American Red Cross, according to the comprehensive program of campaign activity planned by Col. H. A. Metz, of the General Dyestuff Corporation. He is serving again this year as volunteer chairman of a specially organized Drugs, Chemicals and Allied Industries section in the campaign organization.

A representative committee is co-operating with Mr. Metz to facilitate the roll call effort. Serving as members of the committee are David A. Ansbacher, William Hamlin Childs, William S. Gray, Charles L. Huisking, A. Klipstein, Jr., Edward Plaut, William J. Scheiffelin, Jr., and G. A. Wharry.

A number of the committee members, like Mr. Metz, have already served in previous roll calls, and they anticipate even more generous enrolment returns this year in support of the Red Cross need for funds for the maintenance of its extensive metropolitan program of relief, welfare and public health activities. The work of the section is subdivided to cover manufacturing chemists, dyestuffs, oils, paints and varnish, and heavy chemicals.

Approximately 175 similarly organized groups are now being formed under the roll call plan of committee organization of the entire city. Each group, industrial, mercantile or professional, will be directed as in the past by a representative leader in that field serving as volunteer chairman.

MARKED PROGRESS IN ITALY'S CHEMICAL INDUSTRY

Government Aid Important Factor in Post-War Development—Imports and Exports Rise with Domestic Production

Italy's chemical industry has advanced during recent years to a position of international prominence, according to Assistant Trade Commissioner Miss Elizabeth Humes, Rome, in a trade bulletin just issued by the Commerce Department. This development has occurred in face of the fact that the country is absolutely lacking in coal and, with the exception of salt and sulphur, has practically none of the basic materials entering into chemical manufacture. One of the outstanding factors in the progress of the industry has undoubtedly been the encouragement given it by the Italian Government which has taken the form of protective legislation, encouragement of scientific research and in some cases subsidies.

The advance of the chemical industry in Italy since the war is indicated by the increase in the number of companies making chemical or allied products. In 1913 these numbered about 220, while in 1927 the number of companies reported was more than 700. It is impossible to state the production of these establishments in terms of value, but according to official returns the output of chemical plants and those making allied products amounted in 1926 to nearly four million tons. Seventy-five per cent of this production represented bulk commodities such as fertilizers and sulphuric acid.

Italian foreign trade in chemicals, the report shows, has kept pace with domestic production. In 1927 the value of this trade was $75,000,000, a substantial increase over the pre-war figure. Both imports and exports of chemicals have increased in value since pre-war times, the year 1927 showing a gain of nearly $4,000,000 for the former and $6,000,000 for the latter. Exports, it is pointed out, would have made an even better showing had it not been for the loss of important sulphur markets. It is not probable, however, that Italy will be able to correct its adverse trade balance in chemicals and allied products in the near future, owing to the fact that it must import large quantities of phosphate rock for its fertilizer industry and coal-tar crude and naval stores for its paint and varnish manufacture.

Germany and France between them supply practically one-half of Italy's requirements of chemicals and allied products, while Great Britain is her chief customer for these lines. American products represent about 5 per cent of total Italian imports, while the United States in turn takes about 8 per cent of Italy's foreign shipments.

The movement going on in Europe looking to the formation of an international chemical cartel is being deliberately fostered in Italy. When this development comes to pass, the report declares, it seems certain that due consideration will be given to the Italian industry.

COMPETITION IN FRENCH DYE INDUSTRY

Kuhlmann Makes Half of Output Now

The annual production of dyestuffs in France is now estimated at 18,000 metric tons, or three times the production of 1921, which was 5,500 tons. The Etablissements Khulmann produces more than half the entire French production (9,900 tons in 1926), followed by the Colorants de Saint-Denis and Saint-Clair du Rhone.

In 1913 France imported from Germany half the dyestuffs it used. In 1921, 20% of the consumption was imported (1,440 tons out of 7,000 tons); in 1923 11% (1,400 tons out of 11,500 tons), and in 1927 8% (1,570 tons out of 19,500 tons). The French industry now produces one-fourth as much as Germany, and the recent sales agreement between the I. G. Farbenindustrie and the French producers gives France the right to keep the existing production ratio in its expansion activities.

AMERICAN
DYESTUFF REPORTER
Sample Swatch Quarterly

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

MYRON DREW REESER
Advertising Manager

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October 15, 1928

AT THE ROOT OF FASTNESS DISPUTES

WHEN Will Rogers comes out as the "bunkless candidate" for President he is expressing the spirit of his times. Someone has called this the "debunking" age. It is doubtless true that more bunk has been withered by the spotlight of publicity in our business life than during any previous era; but perhaps the worthiest cause of all has been the extraction of bunk from selling, particularly from advertising. Experienced advertisers have learned to their sorrow that buncombe no longer goes across with the more discriminating element in the American buying public.

In our special field of dyes and textile chemicals one advertising campaign that has striven consistently to base its arguments on actual conditions is the notable series of messages on Fast Dyed Fabrics that have been appearing over the Du Pont trade-mark. These advertisements have raised to the dignity of a merchandising creed the biggest selling point for fast dyes. But they have sought to do this not by employing the pompous phrase nor by preaching a glorified brand of buncombe, but by presenting their argument in a coherent series of simple, convincing stories, told in words and pictures that cut into the reader's understanding like a rapier.

This series of advertisements, based on the slogan, *"Everybody Gets More for Their Money in Fast Dyed Fabrics,"* is in plan a high type of institutional advertising; it is designed not to sell a product but to sell a concrete idea, and does so in a style so engagingly frank as to be powerfully persuasive. Repeatedly there have appeared in these advertisements various sidelights on the fastness situation that reveal not only a well-informed intelligence in the planning of the campaign, but also an insight into conditions as they actually are.

That such a clear understanding of the problem exists in some quarters is extremely encouraging to those who, like the REPORTER, have persistently preached the need for educating the public on the fastness question. As an example of how the campaign deals with a concrete idea, take these paragraphs, quoted from a Du Pont advertisement that has appeared in the REPORTER and other textile journals:

> A salesman's got a hard enough time lugging around a big sample case without trying to talk the chemistry of colors or stuff like that. And the buyer said his job was buying, not being king's taster to the public. Anyway you couldn't expect a sales girl to know the secret life of all the merchandise she sold. Well, the truth came out with the colors in the very first wash, the truth that even the complaint department couldn't deny, the truth about the dyes.
>
> It seems there were two kinds of dyes: one would wash and one just wouldn't. You couldn't really tell, of course, until you'd washed the goods. And the customer was the first one to do any washing.

That last phrase illuminates in a flash one of the most deplorable factors involved in the fast color problem: that is, the breach between the ultimate consumer of textiles and the mills. Narrow that breach and a long stride will have been taken toward cleaning up, once and for all, the confusion that prevails almost everywhere over the definition of fastness in fabrics. The customer should *not* be "the first one to do any washing." The public's ignorance of the various degrees of fastness in dyed fabrics is at the root of every dispute over claims for faded goods. The public and the textile mills do not understand each other.

Perhaps the one weak point that might be charged against the type of advertising campaign for fast dyes being carried on by Du Pont is that it avoids reference to the need for definite *standards* of fastness; possibly too much emphasis is given to the general idea that fabrics should be washable, and not enough attention to a more important objective, namely, to establish definite fastness standards based on laboratory tests, and to educate the consumer in the meaning of those standards. The practical object, of course, should be to satisfy those who buy fabrics by grading all goods according to fastness standards. But it is not properly the function of any *one* dyestuff manufacturing firm to bring about such an end through its advertising. The responsibility rests upon the dye industry and the textile mills, working cooperatively through some central agency such as the Technical Bureau proposed by the president of the American Association of Textile Chemists and Colorists.

In his discussion of the proposed bureau published in the Proceedings in this issue, Dr. Killheffer states:

> We have no intention, as an association, of setting ourselves up as a board of censors and telling the stores what they should or should not sell, but we simply want some bureau set up at some point that can do testing for anybody who is interested in

having a test made, so that the ultimate consumer of merchandise might get goods of the texture, of the color and of the finish that they were paying for, and many times think they are getting but really aren't.

Such a project, if intelligently directed and adequately supported, would eventually clear up the situation that will exist so long as the customer is "the first one to do any washing." In a word, it would endeavor to place the textile mill on speaking terms with the public that consumes its products. That would be striking directly at the root of a great evil which has been rather lightly called "the fastness problem," but which threatens to grow very formidable unless checked.

A LIST OF IMPORTS

NOTHING in this whole world is commonplace to those who have the vision of the poet or the scientist. Modern educators agree almost unanimously that no person can properly understand modern civilization in all its complex relationships, and particularly the relation that he himself holds to the world around him, unless that person knows enough science to employ it as an "orientator," as a means by which to gauge his proper place in the civilized world in which he moves.

This principle can be further elucidated by advancing the argument that of all branches of modern science, chemistry is unquestionably the most essential to that complete understanding of modern life set up as the ideal by educators.

One may take as a concrete illustration such a commonplace thing as a list of this country's chief imports. Such a list appears in the latest edition of the Commerce Year Book, covering the imports for last year, and tabulates them as follows in the order of their total value:

TOTAL IMPORTS, 1927

$4,185,000,000

The principal imports are:

Raw Silk	$390 Million
Crude Rubber	340 "
Coffee	264 "
Paper and Pulp	263 "
Sugar	258 "
Furs	136 "
Oil	113 "
Hides and Skins	112 "
Tin	101 "

Commodities of this kind, essentially raw materials, form the basis of our civilization. Add to these iron and coal, cotton and wheat, all of which we export, and you have a complete list of the necessities of life, with a few luxuries, like furs and coffee, thrown in for good measure.

But what have these to do with a scientific understanding of modern civilized society? The question may best be answered by asking another: Of what practical use to the civilized world would these raw materials be if it were not for the science of chemistry that underlies most of the processes through which every one of them must pass in order to become the finished products on which the civilized world depends for its existence?

VISITORS TO SOUTHERN TEXTILE SHOW ENJOYING ACTIVE WEEK

This is an important week for the textile industry of the United States, and particularly for that portion of it located along the Southeastern seaboard and points west. With their objective Greenville, N. C., several thousand textile executives, superintendents, master mechanics, dyers, bleachers, finishers and laboratory chemists have left their offices and shops this week for a sojourn in the neighborhood of Textile Hall, Greenville, where the Southern Textile Exposition is in full sway.

The management of Textile Hall has made certain that as many textile men as possible will see this year's exposition. An invitation has been sent to the president of every cotton mill in the South, together with season passes; invitations have also been sent to every superintendent with two passes for himself and two for the master mechanic. Altogether about 3,500 invitations were sent out, and the results naturally promise a lively week. The first few days of the show, which opened its doors last Monday morning, have proved that the management's course has reaped its expected rewards. The attendance is beyond all expectations.

A committee of six hundred from the Chamber of Commerce have acted as the welcoming committee of the show. A number of dances, receptions, luncheons and other entertainment have been planned and are being run off one after the other during the week.

FAST COLOR FABRICS DISPLAYED AT ATLANTIC CITY

Interest at the Du Pont Products Exhibit on the Boardwalk at Atlantic City centered last week on a window display of cotton and rayon cotton dress materials dyed with Du Pont vat dyestuffs. The goods exhibited bear the "Nafal Tested Fast Colors" tag, attesting the fact that samples have been tested for fastness by the Pease Laboratories, Inc., of New York City. Each of the tags shows the laboratory test number, stating: "A sample from the particular dyeing of which the goods bearing this label are a part has been tested by the Pease Laboratories and conforms to the standards for fast colors established by the National Association of Finishers of Cotton Fabrics and the standard washroom practice as published by the Laundryowners' Association. A definition of these standards has been filed with the Bureau of Stand-

ards, U. S. Department of Commerce, and the Federal Trade Commission, Washington, D. C." The label is protected by copyright.

The dyeing and printing of the materials were done by the United States Finishing Company, New York City. The fabrics exhibited included broadcloths, warp sateens and dimities by the Sherman & Sons Company, rayon voile by J. Grossman & Co., broadcloth by G. Sidenberg & Co., cretonne by F. A. Foster & Co., broadcloth by Robinson & Golluber, Irish poplin by Burton Bros. & Co., plain and Dobby broadcloth, and warp satteen by J. S. Bernheimer & Sons.

EXTRACTORIALS

At present centralized research is cutting costs in all branches of industry. Metal working, textiles, railroads, woodworking, paper manufacturing and one hundred and one other ramifications of modern industry are all benefiting by the latest phases of scientific research.—*E. F. Houghton Company's Black and White.*

Some of the youngsters who distained, when their careers as schoolboys came to an end in June, to enter upon the textile life of their fathers, are not finding it easy to secure forms of employment more suited to fastidious tastes. Openings have not been numerous, and the present idleness of the collar wearers may last a long time.—*The Textile Review.*

The selection of a proper plant site is undoubtedly the making or breaking of many business enterprises. Only too often is a manufacturer lured to a location—sometimes against better judgment—by an overzealous civic organization with promises of low taxes and cheap labor, only to find that these advantages are more than offset by any number of unforseen difficulties which were not brought to the plant owner's attention.—*Chemical Markets.*

The principles of arbitration and friendship have guided me for many years. I don't believe that any man is a superman because he is in charge of a great industry, but that every man is a man for what he is worth by the measure stick of humanity. The aristocracy of this day is not the aristocracy of birth or wealth. In business this aristocracy is reflected by arbitration and friendship.—*Charles M. Schwab.*

Read trade literature. Study your business and other men's businesses. Talk with people and get their views and their experiences. Then go one step farther. Make that information work for you.—*"The Bulls Eye."*

That all big stores should be equipped with laboratories where colored goods could be tested for fastness was advocated by J. G. Williams, of the analytical and testing laboratory of Messrs. Selfridge & Co., Ltd., at the Summer School of the Drapers' Chamber of Trade at Caius College, Cambridge. Although there were some 1,500 dyes in existence faulty fastness was the cause of many of the complaints brought by customers. Not only were the clothes themselves ruined by loose dyes but the skin and even the health of the buyer might be injured. A case had been brought to his notice where an 18 guinea gown had been damaged through the wearer leaning on an art serge tablecloth.— *The Dyer and Calico Printer (London).*

Present-day training in industrial practice seems to be based largely on traditional lines. We teach the things that were and the things that are. I want to carry training into the things which may be. I agree that until a student appreciates and understands present method and practice, it is impossible to lead him into new avenues, but I suggest that men of the highest mental capacity should be trained beyond the traditional limits.—*Frank Hopkinson, in Journal of the Textile Institute.*

CORRESPONDENCE

On the Analysis of Sulphonated Oils

Editor, AMERICAN DYESTUFF REPORTER:

In connection with an article in the September 17 issue of the REPORTER on the "Analysis of Sulphonated Oils," by W. H. Thomas, it may be of interest to state, though not mentioned in the article, that the original outline of the methods therein recommended were published by the writer in the Journal of Industrial and Engineering Chemistry, page 858 (1917).

Other references on the same subject by the writer published in the Journal of the American Leather Chemists Association are as follows:

"The Analysis of Sulphated Oils," page 20 (1919).

"The Determination of Inorganic Impurities in Sulphate Oils," page 404 (1920).

"The Determination of Total Saponifiable Matter in Sulphated Oils by Difference," page 495 (1920).

"Improved Formulas for the Calculation of Inorganic Impurities in Sulphated Oils," page 159 (1921).

The following other articles on these methods were also published in the latter journal:

"The Analysis of Sulphonated Oils," G. W. Schultz, page 190 (1918).

"The Analysis of Sulphonated Oils," Committee Report (1919), page 266 (1919).

"The Analysis of Sulphonated Oils," Committee Report (1920), page 95 (1920).

"The Analysis of Sulphonated Oils—an Improvement of the Hart Method," C. Gebhart Bumcke, page 7 (1921).

The A. L. C. A. methods for the analysis of sulphonated oils, particularly the parts dealing with the determinations of organically combined SO_3, ammonia, fat by difference and contents of the ash, are practically identical with the published methods by the writer. They differ only in these two essentials: (a) The addition of salt and ether to facilitate reading of the end-points during titrations, and (b) the use of normal sulphuric acid instead of half normal in the determination of combined SO_3. The first change was recommended by the writer in a private communication to G. W. Schultz, then chairman of the committee already referred to; the suggestion to substitute the stronger acid was made by Dr. G. C. Bumcke and is discussed in his article mentioned above.

In passing, it may be mentioned that the use of oleic acid to prevent foaming in the xylol method for the determination of water in soaps and similar products, mentioned in Mr. Thomas' article, was likewise the subject of a paper by the writer (Journal of Industrial and Engineering Chemistry, page 598, 1918).

Respectfully yours,

RALPH HART.

Editor, AMERICAN DYESTUFF REPORTER:

Sulphonated castor oil is universally sold at so much per pound. With this in mind, it is hard to see where the volumetric test can be considered as accurate a method for total fat content as the gravimetric, for the gravimetric test gives direct results on the same basis on which the oil was purchased. It is not my desire to enter into a discussion as to the merits of the various methods of gravimetric procedure, but to call attention in passing to the fact that I believe all will agree that if a gravimetric method is used, wherein the oil is boiled for a sufficient length of time with HCl to free it from combined sulphuric acid, and if sufficiently low temperatures are used during evaporation of the ether to prevent carrying over oil, and during the drying-out process to prevent distillation of the fatty acids, and that if this same method is used on different samples, good comparative results will follow.

Can as much be said, on the other hand, for the volumetric method? For, in addition to giving an erroneously high result as compared with the basis on which the material is purchased, it is rather generally used with the factor 0.81 when refiguring to a gravimetric basis. The volumetric test and this factor 0.81 are entirely dependent on the ratio of the specific gravity of the oil which is present to the specific gravity of that part of the product which is not oil.

Let us take two samples of sulphonated oils which have the same percentage of oil content gravimetrically, by way of illustration, assuming both to have the same amount of combined SO_3. Sample No. 1 is a sulphonated castor oil which has been well washed to clear it from uncombined acid and has been finished by adding dilute ammonia. Sample No. 2 is a sulphonated oil which has been sulphonated and then neutralized, without washing, with caustic soda solution.

It is readily seen that the specific gravity of that part of the second sample which is not oil is a great deal higher than the corresponding part of the first sample, for it will contain several times as much SO_3, with a correspondingly large amount of the heavier alkali to neutralize this free acid. So, although the first sample is the superior product for most uses, the second will show a higher volumetric test.

If the second sample had been adulterated by the substitution of red oil (approximate specific gravity 0.905) for some of the castor oil (approximate specific gravity 0.965) the color would be somewhat darker, but the volumetric test would have been increased while the product was being cheapened.

Although the second sample would be rarely met with in present practice, it is true that some sulphonated oils have a much higher total SO_3 content than others, and that some are finished with ammonia and others with caustic soda, making it quite evident that the volumetric method of analysis would not always be a correct method for comparing relative values of samples of different manufacture.

I agree with the opinion of other contributors that while the total fat content is an indication of the money value of a sulphonated oil, it should by no means be the only deciding factor in its purchase. The old saying that "the proof of the pudding is in the eating" is very applicable to this subject. If an oil is being used in dyeing it is necessary that it do its work efficiently and stay in perfect solution at whatever temperature might be used and with whatever might be used in the dye bath with the oil, for it is a thankless job to reclaim goods which have become oil spotted due to the oil "breaking" in the dye bath. Similarly, the oil must perform well whatever duties are required of it wherever it might be used.

Thus, although the total fat content is always an important test, and is an indication of the money value which the manufacturer has put into his product, there is another test which is equally important and should always be used in conjunction with it. This is a practical test where the oil is subjected to every condition that it may be asked to meet in actual practice, and it is as much the duty of the plant analyst to be able to make a comprehensive test of this kind as to be able to determine the total fats present.

If the samples of sulphonated oils are tested comparatively by these two methods, the tests should clearly indicate to the purchaser the money value which he will get out of them.

E. E. PROCTOR,
Director of Production and Research,
Providence Drysalters Co.

The Durand and Huguenin Plant of Basle

By Chas. E. Mullin, M.Sc., F.C.S., F.A.I.C., F.T.I.
Professor of Textile Chemistry and Dyeing at Clemson College, S. C.

YOU have all heard of the Indigosols, and I am certainly sorry that you were not with me at the Durand & Huguenin plant, where these really remarkable products were developed, to see just how much has been and can be done with them. Through the courtesy of Mr. Kuhl, of the Carbic Color & Chemical Company, New York, and G. L. Bard, director at Basle, I had the great pleasure of spending considerable time studying these products and their applications with the men who have handled all of the development work at Basle and, therefore, know most about them.

The Indigosols, like all other dyestuffs, are not applicable for every class of work or purpose, but after seeing the results possible by their use none can deny that they will eventually fill an important place in the dyeing field. It took about ten years for the older vat dyes to find any very wide use in the textile industry, and let us hope that the American textile industry will not be as slow in adapting these newer products as they were the parent vat dyes.

For the benefit of those who are not familiar with their application it will be interesting to know that the Indigosols are applied to cotton or rayon in the same way as the direct dyes, by padding or printing; to wool or silk in the same way as the acid dyes, and also to acetate silk, to give all of the properties, such as fastness, etc., of the parent vat colors, but without any special equipment or apparatus such as may be necessary to apply the ordinary vat colors.

While a great deal of research work has been done upon the Indigosols, this work is still going forward rapidly and we may look for many advances in this field in the near future, both as to application methods and new products. The most recent research upon the new products is centered upon the Indanthrene vats, while some of the most recent advances in application have been upon wool, acetate silk, combinations with the Naphthol AS series and related products, and in printing. It has been found, for example, that the fastness of the Indigosols upon wool exceeds that of many of the chrome colors on wool. This is of particular interest for light shades upon wool, where the chrome colors are usually less fast than in heavy shades, and where the cost of the dyestuff is of less importance. At the same time the Indigosol-dyed wool is softer than the chromed stock.

In fact, in many cases it is possible to obtain a greater fastness of the color to certain agencies by means of the Indigosol than with the parent vat dyestuff. Probably this may be due to a better penetration of the fiber by the Indigosol than by the parent vat dyestuff. This, coupled with their ease and simplicity of application and manipulation, both in dyeing and in printing, is the principal claim of the new water-soluble products. Even though the cost of the new products is somewhat higher than that of the parent vat dyes, as would be expected, the saving in time, chemicals, apparatus, etc., often greatly offsets this increased cost of the dyestuff, while the ease of application frequently makes their use possible where it would be impossible or impractical to use the vat dye.

Another interesting field for the Indigosols is on acetate silk, particularly for printing. Indigosol Black IB is claimed to be of interest for the production of a good shade of black upon acetate silk. About 15 per cent is necessary for this purpose, with plenty of Glauber salt. The Indigosols are also, it is said, finding a wide usage for fast colors on true silk, and, as they may be applied cold, are useful with wax resists for imitation batik and other special styles upon true silk.

Durand & Huguenin also manufacture an extensive line of fine basic and printing dyestuffs. Some of the most interesting recent additions to their line are Acridine Flavine RD, a basic dye which is said to withstand Rongalite and can be mixed with any other basic dyes without precipitation. This, of course, renders it particularly useful for basic color discharge work. Polytrope Orange 2R is a very recent addition which dyes pure and weighted silk in fast-to-light shades, but leaves both acetate and viscose silk unstained. It is dischargeable.

Chrome Fast Xanthine 2R on an aluminum mordant gives almost the same shade on chrome as Alizarine Orange does on aluminum. This is a considerable advantage in connection with the printing of chrome colors, as it entirely avoids the use of the aluminum in connection with chrome printing. Chromo Citronine 3R is of considerable interest in Europe to displace Persian berry extract, as it gives about the same shade but is faster to light.

(This is the fourth of a series of articles by Professor Mullin describing some of the larger dye plants in Europe. The fifth will appear in an early issue.)

During the Southern Textile Exposition held at Greenville, S. C., this week the following representatives of the Mathieson Alkali Works, Inc., will be in attendance at this firm's booth, Nos. 115 and 116, in the Annex: F. O. Tilson, Southern district sales manager; J. R. Schmertz, advertising manager, and R. C. Stamples, E. M. Murray, E. M. Rollins, V. M. Coates, J. V. Ivey and Z. N. Holler, all sales representatives.

The Mathieson exhibit will be devoted to the principal Mathieson products used in the textile industry, such as caustic soda, soda ash, liquid chlorine, bleaching powder and aqua ammonia.

Peroxides for Textile Bleaching

Their Past, Present and Probable Future

Value of Facts About Peroxide Used—Development of the Peroxide Bleach in the United States—The Pietszch and Weisenstein Processes—The Peroxides in Use To-day—Advances in Art of Bleaching—The Cost Question

By H. G. SMOLENS

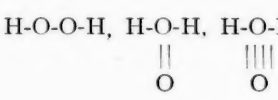
Consulting Engineer, The Buffalo Electro-Chemical Company

THERE has been, during the past several years, a great increase in the use of peroxides for bleaching textile fibers. Part of this increase is due to the decline in the market price of peroxides, brought about by improvements in the manufacturing processes. Part is due to the ever increasing knowledge of peroxides and the methods of applying them.

Hydrogen peroxide is usually considered the chemical compound H_2O_2. As used in textile bleaching it comes in a solution of some kind containing hydrogen peroxide, water and whatever impurities, preservatives, etc., are either produced in this solution or purposely added during its process of manufacture.

Although peroxides are sold by weight, all of our standard forms of measuring them depend on their content of oxygen gas. However, the measure of oxygen gas in a peroxide as received in the bleach house is not at all any indication of its money value or even of its value for any particular bleaching operation. These probably depend on the manner in which the active (atomic or nascent) oxygen is contained in the hydrogen peroxide molecule, and the way in which it reacts in an alkaline solution.

Hydrogen peroxide, H_2O_2, may be any one or all of the three isomers:



In chemical compounds of this type, containing an atom which may have more than one valence, the molecule with the highest valent atom is usually the strongest and most stable.

It is highly probable that all peroxides contain some of each of the three isomeric molecules, the relative proportions of which determine the stability and value of any particular peroxide.

Many bleachers believe (having been told by those who are supposed to know) that a peroxide bleach solution should foam, bubble and show other signs of violent reaction, even before a bleachable material is introduced. This is entirely erroneous. Any violent reaction visible in such a solution indicates that the valuable peroxide is rapidly breaking up, with an evolution of oxygen gas, which does no bleaching at all; which, in fact, hinders successful bleaching. Peroxide bleaching is not and should not look like a gas reaction.

The possession of a few facts about any particular peroxide is usually of great value to a bleacher. In order to check up on the claims and promises made for commercial peroxides, the following information should be requested of manufacturers of these chemicals:

1. Acidity, quantitative and qualitative.
2. Preservatives, quantitative and qualitative.
3. Weight of residue, if any, on evaporation to dryness.
4. Loss in strength during storage in original containers.
5. Loss in strength during a twenty-four-hour evaporation in an open vessel.
6. Uniformity of volume strength.
7. Uniformity of specific gravity.
8. Uniformity of H_2O_2 percentage by weight.

Their Past

Thirty or forty years ago barium peroxide was being used to some extent in bleaching silk, mainly tussah silk. Then someone conceived the idea of treating barium peroxide with sulphuric or phosphoric acid so as to produce a hydrogen peroxide solution and an insoluble barium salt which could be removed from this solution by a simple filtration. Thus was started the industry which still produces barium peroxide and makes from it hydrogen peroxide solutions of from ten-volume to twenty-volume strength.

Such hydrogen peroxide solutions were used by many bleachers of wool and silk, more so, at first, in Europe than in the United States. Gradually, however, both the demand for fast white wool and silk and the desire to imitate European bleach increased, so that just before the World War considerable quantities of ten-volume hydrogen peroxide made from imported barium peroxide were being produced and sold for bleaching in the United States.

Some years previous to this there had appeared on the market a new peroxide, sodium peroxide, the comparatively lower price of which was made possible by the electro-chemical reduction of fused common salt. Metallic sodium, produced at the cathode of the electric furnace, was collected under kerosene or other suitable liquid containing no available oxygen and later turned into sodium peroxide.

Even though this sodium peroxide was much cheaper, on the basis of oxygen gas content, than the ten-volume hydrogen peroxide, bleachers did not take to it very

kindly on account of its causticity and inflammability, and because it was a nasty material to handle. Manufacturers of sodium peroxide, therefore, began to treat it with sulphuric acid, producing a water solution of hydrogen peroxide and sodium sulphate of twenty-five-volume strength. They also began to apply more or less scientifically to commercial bleaching, the knowledge gained from a great deal of experimental laboratory bleaching. The twenty-five-volume hydrogen peroxide was offered to bleachers who either could not or would not use the solid sodium peroxide. Still, they did not any too quickly stop using the ten-volume hydrogen peroxide.

Then in 1914 the war started and imports of barium peroxide from Europe dropped off and soon practically ceased, as ship space was required for more urgently needed materials. At the same time demands for wool and silk products increased enormously and caused a great increase in the demand for peroxides. This is when sodium peroxide and the twenty-five-volume hydrogen peroxide made from it, came on with a rush and easily captured the entire bleaching peroxide market, while the American production of barium peroxide was being developed. Such development was at first under governmental control, because of the demand for barium peroxide to be used in the manufacture of star shells, tracer shells, flares, etc., for military and naval uses.

Since 1919 attempts have been made to revive the interest of bleachers in the Hydrogen Peroxide solutions made from Barium Peroxide, but without conspicuous success.

In 1923 there appeared in the textile chemical market a new liquid peroxide, imported from Europe, called "100-volume." Shortly afterward there appeared three other imported 100-volume peroxides. Then came their classification into Austrian, English, German and Swiss 100-volume peroxide, in accordance with their points of origin.

So many of the best informed and most expert peroxide bleachers tried out and continued to use these 100-volume peroxides at a price equal to or higher than the equivalent price of sodium peroxide and its twenty-five-volume hydrogen peroxide that the market price of the latter two began to drop.

In 1925 was started the construction of a large plant in Buffalo to manufacture 100-volume peroxide by the Pietszch process. This plant has been in successful operation for almost a year and is rapidly increasing its output. The Pietszch process produces, by electrolytic reaction, a solid alkaline persulphate which can be purified to a very high degree. This pure persulphate is then steam distilled and the direct distillate, which is not less than 160-volume hydrogen peroxide, is accurately diluted with a specially prepared water to 100-volume for shipment to bleachers.

The building of the Buffalo plant soon caused the establishment of a plant in Niagara Falls to manufacture 100-volume peroxide by the Weisenstein process. This plant has been in operation for over a year and is also increasing its output. The Weisenstein process produces, by electrolytic reaction, a liquid mixture of sulphuric and persulphuric acids which cannot be separated. This mixture is then steam distilled and the direct distillate, which is about fifteen-volume hydrogen peroxide, is concentrated by a vacuum evaporation to 100-volume for shipment to bleachers.

Their Present

To-day there are available for textile bleaching the following peroxides: ten-volume, seventeen-volume or twenty-volume hydrogen peroxide made from barium peroxide, sodium peroxide, twenty-five-volume hydrogen peroxides made by a combined electrolytic and chemical process. There is not enough peroxide being imported to make it worth mentioning.

Hydrogen peroxide solutions made from barium peroxide are quite pure products and can be used for any type of bleaching. They have, however, many disadvantages for textile bleaching, some of which are the following:

1. On account of the low strength, large quantities of material must be handled.
2. The paraffine lined wood barrels used for shipping frequently leak.
3. Their acidity is usually quite high.
4. Since they must be manufactured at low temperatures, these peroxide solutions are not so stable at high temperatures.

The bulk of the hydrogen peroxide solutions made from barium peroxide are turned into 10 volume, bottled, and sold under U. S. P. specifications in drug and chain stores. Were it not for the fact that there has been and is now a 100% duty on barium peroxide, the manufacture of this chemical in the United States would cease very shortly, as it can be bought abroad for about half of our price. Also, were it not for the existing market for blanc fixe, the insoluble barium salts produced when hydrogen peroxide is made from barium peroxide, the manufacturers of U. S. P. peroxide solutions would probably discontinue operations unless they could get a reduction in or a removal of the duty on the barium peroxide.

Sodium peroxide, being a solid, is the most concentrated form of all the peroxides. It would also be the most convenient to use, for textile bleaching, did it not have many disadvantages, of which the following are a few:

1. Sodium peroxide, before going into a bleaching operation, must be completely dissolved. Any undissolved particles, no matter how small, will burn holes in whatever fiber they come in contact with.
2. Sodium peroxide, dissolved in water, produces a hydrogen peroxide solution containing caustic soda (about a pound of caustic soda per pound of sodium peroxide). To prevent the injurious effect of this caustic soda on fibers, and its catalytic action on hydrogen peroxide, so-

dium peroxide is usually dissolved in a sulphuric acid solution. This solution, to completely dissolve the sodium peroxide, must contain an excess of acid over the theoretically required amount. Therefore, the ordinary peroxide solution made from sodium peroxide contains water, hydrogen peroxide, sodium sulphate (about two pounds of sodium sulphate per pound of sodium peroxide), sulphuric acid and whatever impurities there are in the peroxide and in the acid.

The presence of sulphuric acid and sodium sulphate must be taken into serious consideration when alkalies such as silicate of soda are to be used in the bleach liquor, as they usually cause a breaking of the silicates, which results in harshness, unevenness, spots, etc., in the bleached goods.

It is also quite difficult to maintain the equilibrium of such a solution. Therefore, the stability of the hydrogen peroxide solution and its bleaching efficiency are comparatively low.

3. There is a serious fire risk attached to the use of sodium peroxide in the bleach house as it will, when damp or wet, quite readily support the spontaneous combustion of organic materials.

4. The people who have to handle sodium peroxide are always affected by the combined action, on their faces and hands, of its causticity and oxidation.

The 25-volume hydrogen peroxide made from sodium peroxide removes disadvantages 1, 3, and 4 listed above for sodium peroxide, but has instead all the objections raised for the peroxide solution made from barium peroxide. It is far superior to the peroxide solution usually prepared from sodium peroxide by the individual bleacher, because of refinements possible in its large-scale production.

The market price of 25-volume hydrogen peroxide solution is a better indication of the value of sodium peroxide than the market price of the latter, because its manufacturers can certainly produce this peroxide solution cheaper than the bleacher who makes it up as he needs it.

The electrolytic 100-volume hydrogen peroxides are the most stable and most efficient of all the available peroxides, and may be used with the greatest success on all types of fibers. The comparatively small quantities usually required allow the operation of standing baths, without throwing away any valuable solution to maintain a constant quantity of bleach liquor. There is no annoyance from leaking barrels. Any alkali or combination of alkalies and oils required for a desired result may be used with 100-volume peroxide as there should be no impurities in these peroxides, which have any effect on the bleaching reactions. If accidently splashed on the skin of the bleacher, a mild stinging sensation is produced which soon disappears and leaves no injurious effect because hydrogen peroxide attacks only dead, not live tissue.

The great advance in the art and science of peroxide bleaching during the past year or so has been due entirely to the 100-volume peroxides. They have made possible many kinds of bleaching heretofore considered impossible on account of the physical and chemical limitations of the existing peroxides. They have, by their initial strength alone, permitted the use of peroxides in fields (such as oils, waxes, etc.) closed to weak peroxide solutions. They are enabling wool and silk bleachers to turn out work far superior, in every respect, to that formerly done with sodium peroxide. They are allowing cotton bleachers to bleach bulk goods to a degree of whiteness, and levelness, at a cost unheard of only a few years ago.

Their Probable Future

The improvement in the quality of 100-volume or stronger peroxides and in their manufacturing processes will continue. The price of these peroxides will allow the bleaching of all fibers and fabrics at most reasonable costs. The knowledge of the application of concentrated peroxides to textile bleaching will advance with the widening of the range of peroxide bleaching and the arousing of new interest in the use of peroxides.

In a short time concentrated peroxide solutions will have entirely replaced the comparatively small amount of sodium peroxide still used for bleaching wool and silk, because, at no higher cost, they leave these fibers soft and uninjured, while turning them white. Concentrated peroxide solutions are rapidly replacing, and should entirely replace sodium peroxide in the bleaching of colored cotton goods, as, at no higher cost, they turn these goods out whiter, evener and much softer.

Concentrated peroxide solutions will come more and more into bleacheries where cotton goods are processed in bulk. Were it not for the fact that practically all existing cotton bleaching equipment has been designed for some form of chlorine bleaching, a great deal of cotton goods of all kinds would very quickly be swung into peroxide bleach. As it is, we are rapidly learning how to adapt successfully the concentrated peroxide processes to chlorine bleaching equipment.

In the near future there will, no doubt, be opened the first cotton bleachery designed and built specifically for concentrated peroxide bleaching. This will be such a revelation to manufacturers and finishers of cotton goods that there will be a considerable scrapping of existing equipment and practice.

Assuming good processing results, the cost question becomes paramount in the quantity bleaching of cotton goods. As far as we now know, the chemical cost of a peroxide bleach will always be higher than the chemical cost of a chlorine bleach. However, it is so much easier, safer and healthier to apply peroxide to cotton as compared to any form of chlorine, that a considerable quantity of cotton finishing will go over to peroxide bleaching for these reasons alone.

The advantages of peroxide bleaching over the chlorine bleaching of cotton are:

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Technical Notes from Foreign Sources

A New Substitute for Gum Tragacanth

Faerber-Ztg. 548, 64 (1928).—According to Dr. Klein, of Salerno, Italy, a perfect substitute for the expensive gum tragacanth as a thickener can be prepared by slicing and drying bananas and grinding the dried material to a meal. Different kinds of the banana can be used. The surprising fact is stated that printing pastes of the vat dyestuffs, particularly of the indanthrene series, if made up with this new thickener, give better and brighter prints than when the thickening agents commonly used are employed. The printings go on easily, wash well, and the colors are stronger. In printing with dyestuffs requiring the use of tannin the advantages are equally great.

[Translator's Note: If the foregoing interesting statements appeared in the daily newspapers under an eye-attracting title featuring the word "bananas" they might well move a smile. But the claims made seem to be inherently justified *a priori*, since the glutinous properties of banana-pulp would doubtless reappear in a paste containing the meal. As to the results claimed, may it not be true that the colloidal properties of the banana juice prevent blinding of the indanthrenes in printing, so that the dyeings appear to be of a higher value than ordinarily, where blinding was taking place regularly to some extent? Reference may be made to a mention of this matter of blinding in a recent abstract in these columns.]

Greening of Olive Oil

S. S. Z., Faerber-Ztg. 548, 64 (1928).—The green color which olive oil often takes on when kept in tinned vessels, or when boiled with water, is ascribed by Marcelli to the presence of minute amounts of copper in the metal container or in the water, and which forms an intensely green compound with the cholorophyll contained in the oil. The formation of this green compound can be used to detect and even estimate traces of copper in water.

Production of Patterns Upon Acetate Silk

English Patent No. 266,777; *British Celanese, Ltd., and G. H. Ellis.*—The goods are printed with a substance which influences the delustering action, in one direction or the other, of boiling liquids or steam upon the fiber. Thus, if goods of cellulose acetate are printed with thickened beta-naphthol, dried, steamed with wet steam, washed and soaped, the printed pattern will have lost its luster more completely than the unprinted. By control of the time factor it should be possible to bring the difference in luster of the printed and unprinted parts to a maximum. In the same way, if the goods are printed with acetic ester, the printed pattern, on subsequent steaming, loses its luster less rapidly than do the unprinted parts.

Also (*English Patent No.* 277,414; *British Celanese, Ltd., G. H. Ellis and R. J. Mann*) the goods may be printed with mono- or poly-basic carboxylic acids of the aliphatic series, or their halogen, amino, or hydroxyl derivatives, and treated subsequently with delustering agents, such as steam or boiling aqueous liquids. For example, after printing with a thickened solution of succinic acid the goods are dried and steamed for five minutes; after rinsing, soaping, etc., the printed pattern will have lost its luster, while the unprinted part remains unaltered; citric acid has a similar effect. If acetic acid, chloracetic acid or propionic acid is used for the acid constituent of the printing paste, the printed pattern comes out lustrous, while the ground is matt.

Also (*English Patent No.* 273,011; *Calico Printers' Association, Ltd., J. R. Whinfield and C. Levin*) the goods may be printed with caustic alkali, washed, and then delustered by boiling water or by a solution of a substance which peptizes the cellulose acetate—e. g., formic, acetic or lactic acids, acetone, furfural, phenols, naphthols, etc. The printed pattern retains its luster through the treatment and a weave is obtained consisting of a lustrous pattern of saponified cellulose acetate upon a matt ground of unsaponified fiber. On dyeing this weave with substantive dyestuffs, lustrous dyed patterns are obtained upon an undyed dull ground. This latter can be dyed with dyestuffs which have affinity for cellulose acetate, thus producing two-color effects in addition to the differentiation in luster.

New Assistant in Dyeing and Printing

English Patent No. 246,504; *Chem. Fabr. Milch, Aktges., and Dr. K. Lindner.*—A sulphonic acid (or soluble salt of it) of the benzene series, which contains an aliphatic sidechain of at least ten carbon atoms, if added to the ordinary dye bath or to the printing paste, increases the softness of the fiber (in the bath, as favoring the taking up of the dyestuff), improves the dispersion or solubility of the dyestuff, hinders a too rapid and uneven taking up of the dyestuff by the fiber, improves the fastness to rubbing and prevents bronzing. Only about 0.01 to 0.1% (on the weight of the goods) of the sulphonic acid is needed. Examples of suitable substances are palmitoylbenzene-sulphonic and stearoyl-toluene-sulphonic acids. These are prepared by condensation of the chlorides of the fatty acids in question with the hydrocarbons, by means of anhydrous aluminium chloride, and sulphonation of the resulting products by oleum. The favorable action of these products in the dye bath can be enhanced

by the addition of mono- or poly-acid alcohols, such as methyl, ethyl, isopropyl, and amyl alcohols, and glycol or glycerol.

Fluorescence of Dyed Goods in Ultra-Violet Light

Dr. L. Kummerer, Melliand's Textil-Ber. 415, 9 (1928).—A short report on the results of examination, in a systematic way, of various dyed fabrics by ultra-violet light. The light-source was a Hanau Quartz-lamp for Analysis, Model 1927, and consists essentially of a quartz-enclosed mercury-vapor arc lamp and a filter of special tinted glass which absorbs almost entirely the visible emissions and transmits essentially only the ultra-violet rays between 400 and 360 m-mμ, most of the active radiation being of the 360 value. The material examined was yarn and piece-dyed goods, some furnished by the I. G. laboratories and some prepared in the author's laboratory.

"As has been known for a long time, the ultra-violet rays excite most substances to luminescence; by this phrase one understands phosphorescence as well as fluorescence. The latter is a display of light which takes place only during excitation (of the molecule by the impact of the ultra-violet rays) and ceases almost at the same time with the irradiation; while, in the case of phosphorescence, this phenomenon persists as a kind of afterglow, even after the exciting irradiation has completely ceased. There are many dyestuffs which, in aqueous solution, show fluorescence even in daylight in which it is principally the blue and violet rays of the spectrum which excite the fluorescence. But on the fiber (with those dyestuffs which are fluorescent in aqueous solution) the fluorescence is in most cases no longer to be noticed in daylight. On the other hand, in ultra-violet light their fluorescence is again strongly visible. Observations are made easy by the fact that the exciting ultra-violet rays are not perceptible by the human eye, while the fluorescence caused by them is plainly to be observed, at least in so far as it in part lies within the limits of the visible spectrum.

Those dyestuffs are distinguished by a specially strong fluorescence which in constitution are derived from fluorescein. Such dyestuffs, for example Rhodamine, Eosine, etc., display upon wool and silk in the ultra-violet light of the analytical lamp a wonderfully beautiful luminosity, which in its liveliest form reminds one of the light of the Geissler tube.

The fluorescence of cotton dyeings is in general less brilliant than with wool or silk dyeings; on the glistening fiber of artificial silk it reaches the same degree of luminosity. It is evident, from the examples given, that it is most prominent in dyestuffs which contain the thiazol ring.

Most dyeings, above all blacks, browns, blues, and greens, either appear dark in the ultra-violet light, or show only a slight difference as compared to the color in daylight. In case of the yellow, red, and violet dyeings, there are specific differences often to be noticed. These are so unmistakable that it is even advisable, often, to employ the ultra-violet lamp in the determination of dyes upon the fiber, or in the testing of the identity of dyeings. For the first, it is a prerequisite that an ample choice of dyeings for comparison, on the same material, be at hand.

Mordant dyestuff dyeings almost all show a velvety, dark aspect in the ultra-violet light, and the same is true of substantive dyeings, which are aftertreated with metallic salts or formaldehyde. Apparently the "loading" of the molecule is the cause of this defective excitability. It should also be mentioned the basic dyestuffs, such as Rhodamine and Auramine, which on wool or silk fluoresce strongly, appear rather dull when fixed on cotton or artificial silk with tannin or Katanol mordant. If Rhodamine or Auramine are dyed upon cotton without fixation, as upon wool, then the characteristic luminosity of these dyestuffs appears. Basic dyestuffs which are fixed upon cotton with tannin-tartar-emetic mordant, appear in the ultra-violet light more fiery in shade than do those which are obtained under the same conditions upon a Katanol mordant. The difference is especially plain in the case of Auramine.

Naphthol AS dyeings mostly have a dark, velvety aspect under the ultra-violet light. Those from Naphthol AS and AS-BS form an exception, especially the combination of these with Fast Scarlet G. GG and RC bases, which show strong red tones.

The irradiation of textile dyeings with the analytical quartz ultra-violet lamp affords therefore, in the excitation of fluorescence, a new means of distinction for the recognition of dyeings It is founded upon a subjective observation, which has the disadvantage that it cannot be simply described and recorded. The scope of its usefulness is limited principally to yellow, red, and violet dyeings. Perhaps it is possible, through use of a light of shorter wavelength and spectroscopic examination of the fluorescence, to make this method of fluorescence analysis more exact, and also available for dark dyeings. In spite of this limited usefulness, the examples given, which make no pretense to completeness, show that the study of dyed fabrics in the ultra-violet light, which can be carried out very conveniently with the form of light source mentioned, can give many a valuable indication to anyone who has to deal with the identification of dyestuffs, and that this difficult art has been enriched by a new auxiliary.

Some of the results obtained are as follows:

TABLE I

Dyeings with	% on Silk	% on Wool	Fluorescence
Rhodamine 6GDN, 3GO	5.0	..	Luminous orange
Rhodamine 3B extra...	1.25	0.6	Luminous light red
Acid Rhodamine BG...	5.0	2.5	Luminous light red
Eosine H8G	5.0	..	Golden yellow, rather dull
Eosine A	5.0	2.5	Dark yellow, rather dull
Eosine BNX	2.5	1.6	Red, rather dull

Dyeings with	% on Silk	% on Wool	Fluorescence
Phloxine GN, BBN....	5.0	2.0	Bright red, dully luminous
Bengal Rose GTO.....	3.0	2.0	Dark red, dully luminous
Erythrosine 1	5.0	2.5	Dark red, dully luminous
Acid Violet 4RN.....	8.0	3.0	Light red
Iris Violet extra.....	1.0	..	Bluish red
Alizarine Direct Geranine B	5.0	2.0	Bluish red
Alizarine Direct Red B, BB	5.0	3.0	Dark red, dully luminous
Fixing Scarlet G, R....	5.0	..	Light red, luminous
Auramine O	0.75	..	Yellowish green, luminous
Thioflavine S	4.0	..	Light yellow, luminous
Rhodinduline Yellow 6G	3.0	..	Yellow, luminous
Rhodinduline Orange N	3.0	..	Orange, luminous

TABLE II

Dyeings with Art.	% on Silk	% on Cotton	
Primuline A developed with 5% Phenol.....	..	5.0	Pale yellow, dull
Bleaching powder ¼° B.	..	..	Ochre yellow
1.5% Orange Developer R and 2% soda ash..	..	..	Orange red
1% Beta-naphthol	..	..	Dark red
0.5% Oxamine Developer MX and 2% Soda Ash	..	..	Black
Thioflavine S	1.0	1.0	Light yellow, luminous
Thioflavine T	1.0	..	Greenish yellow, luminous
Thiazol Yellow G	..	0.5	Light yellow, luminous
Thiazol Yellow G	..	3.0	Dark yellow, luminous
Thiazine Red R	..	0.5	Bluish light red, dull
Thiazine Red R	..	3.0	Dark red, dull
Thiazine Red GXX....	..	0.3	Light red
Thiazine Red GXX....	..	1.8	Dark red
Oxamine Red BN.....	..	0.5	Light red, dull
Oxamine Red BN.....	..	3.0	Dark red, dull
Cosmos Red	..	0.5	Light red, dull
Oxamine Yellow 3G....	..	3.0	Light yellow
Dianil Yellow 3GN....	2.0	..	Light green, luminous
Dianil Yellow HS.....	2.0	..	Light yellow, luminous
Oxydianil Yellow O....	0.2	..	Whitish-yellow, luminous
Brilliant Dianil Green G	2.0	..	Light green, luminous
Immedial Yellow GG..	4.0	..	Light yellow, dull
Thiogen Yellow 5G....	5.0	1.5	Light yellow, luminous
Hydron Yellow GG paste	7.0	10.0	Orange, luminous
Diamine Rose BD, GD.	0.25	0.25	Bluish red

TABLE III

Cotton dyed with	%	Fluorescence-color
Indanthrene Yellow GK paste	20.00	Red orange, dull
Anthra Yellow GC paste..	10.00	Golden yellow
Naphthol AS/Fast Yellow GC Base	..	Black, velvety
Thioflavine S	1.00	Light yellow, luminous
Katigen Yellow GG extra..	10.00	Daylight color
Chrysamine Yellow G..... Aftertreated with 0.33% potassium chromate, 1% copper sulphate, and 1% acetic acid	0.25	Dark brown, velvety
Stilbene Yellow 3GX.....	1.75	Ochre yellow, dull

George L. Baxter is now in charge of dyeing at the Lowell Bleachery, St. Louis, Mo. He accepted a position with this plant a few weeks ago.

THE CAPILLARITY TEST AND THE DYEING OF RAYON

(*Continued from page* 650)

the optimum temperature for rayon dyeing. Glycerine and ethylene glycol were selected as the substances presumably having similar properties to alcohol without the obstacles of low boiling point. Both of these substances increase the crawl of the lower number dyestuffs without in the same proportion increasing the upward crawl of the higher numbered dyestuffs in the same proportion. Transferring the experiments to actual rayon dyeing, it was found that glycerine in the dye bath lessened the differences between skeins, and enabled dyestuffs of wider number range to be employed and to overcome a thin look which is frequently observed with low dyeing numbers. The use of glycerine apparently does not act injuriously in the subsequent handling of the rayon.

Summary

The capillary crawl of dyestuffs is retarded by raising the pH of the dye bath. It is not a function of the surface tension of the solution. Apparently it is a phenomenon of solubility and is equalized by the addition of glycerine.

The Silk Association of America, Inc., announces the appointment to its board of managers of Robert G. Blumenthal, of Peierls, Buhler & Co., Inc., and to its executive committee of S. O. Martin, of C. K. Eagle & Co., Inc. These appointments have been made to fill vacancies left by the resignation of H. P. Howell, formerly with Peierls, Buhler & Co., Inc., who is now senior executive of the Commercial National Bank & Trust Company.

The Sunbury (Pa.) Converting Works have awarded a general contract for concrete footings for their new mill at Belvidere, N. J., to Baton Construction Company, 1713 Sansom Street, Philadelphia, Pa., and it is understood that award for superstructure will be made to same contractor. W. E. S. Dyer, Philadelphia, is architect and engineer.

The International Dye & Print Works, Inc., Paterson, N. J., recently organized with capital of $1,000,000, has awarded a contract to the Edward Reihl Company, 85 Delaware Avenue, Paterson, for alterations and improvements in an existing mill at 55 First Avenue. The company recently awarded contract for a one-story mill unit on adjoining site.

Fred Wilman, overseer of dyeing for the Harris-Emery Company, Quechee, Vt., has resigned his position with that company, to be succeeded by Albert Newbury.

PEROXIDES FOR TEXTILE BLEACHING

(*Concluded from page* 674)

1. Such great simplification of the bleaching process that in a comparatively short time, goods may be simultaneously boiled out and bleached.

2. A great reduction in the shrinkage and in the loss in weight. This will in many cases more than cover any additional cost of the chemicals.

It certainly seems as though peroxide bleaching has heretofore not been taken seriously enough by the many finishers of cotton and cotton/rayon goods. The few of them who have worked out suitable concentrated hydrogen peroxide processes usually do not care to advertise this fact among their competitors. The manufacturers of the concentrated peroxide solutions certainly should not be the ones to do such advertising.

Therefore, bleachers who can use peroxides should not hesitate to investigate these 100-volume hydrogen peroxides and to call upon their manufacturers for information regarding their application to various fabrics and in whatever equipment is available.

BLEACHING IN THE KIER

Most technical men who will visit the Southern Textile Exposition at Greenville this week will be watching for evidence of the newest developments in processing textiles. Something new in the art of bleaching is promised by the Roessler & Hasslacher Chemical Company, of New York, which, in an announcement, alludes to a method of bleaching that will be demonstrated at its exhibit during the exposition.

"Who is there among bleachers," it is queried, "who has not sighed over the time-consuming process through which cotton must pass from gray to white?" There will be demonstrated to the bleacher in pictures, it is stated, a method whereby he will be able to visualize the original gray goods entering his kier and after a short period coming out a full white. Even the caustic boil-off, with its chances of weakening the fiber, will be dispensed with, as well as the sour, the chemic, the anti-chlor and innumerable washings, through a method of bleaching characterized as "revolutionary," according to this announcement.

The R. & H. booth is located in the balcony of Textile Hall in Greenville and bears the numbers 343 and 344.

MILLING BROWN SUPRA AMONG NEW AMACID COLORS

The American Aniline Products, Inc., New York, has recently developed and placed on the market a new addition to its Amacid colors, Amacid Milling Brown R Supra. While this color has a foreign prototype, it has not been made heretofore in the United States. It is described in the announcement as a good leveling color with very good solubility and fastness properties. Its fastness to light is said to be good, and fastness to washing, stoving and salt water excellent.

Amacid Milling Brown R Supra, it is further stated, is of particular interest to dyers of blankets and similar woolen materials, where it may replace chrome browns and where acid colors of the best washing fastness are required. It is also described as suitable for bathing-suit yarns and silk linings because of its resistance to perspiration.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

EUROPEAN AGENCY

Old, reliable German-Czechoslovakian concern of first-class standing and with best business connections in Germany, Czechoslovakia, Austria, Hungary, the Balkans, Italy and France, offers its services for the sale of *American raw materials, chemicals and dyestuffs* in Europe on commission basis, or for own account. Brueder Drechsler, Pilsen, Czechoslovakia.

TEXTILE CHEMIST

Textile chemist and dyer wants steady position. Eighteen years' experience. Thoroughly competent in all lines of bleachery work, including art silk mixtures and vat colors. Can supervise development work or handle production. Address: Classified Box 475, American Dyestuff Reporter.

PIECE GOODS DYERS' SALES EXECUTIVE

Will secure new business, silk weighting and dyeing, rayons, etc. Large following New York mill agents and converters. Commission. Address: Classified Box No. 484, American Dyestuff Reporter.

DYEING PLANT WANTED

Going concern located in Philadelphia or vicinity, with established trade in the textile industry, desired. C. S. Cheleden, 1316 North American Building, Philadelphia, Pa.

PLANT CHEMIST

Dyestuff chemist with practical experience and capable of running a plant. Position vacant in one of the oldest dyestuff plants in the country. Address: Classified Box 485, American Dyestuff Reporter.

PRINTING COLORIST

Wanted—Block-screen, machine printing colorist, chemist; German preferred; with reliable concern. Address: Classified Box 486, American Dyestuff Reporter.